

Scheme and Syllabus

B.Tech. Food Technology

Batch 2014 onwards



By
Department of Academics

IK Gujral Punjab Technical University

IK Gujral Punjab Technical University
B.Tech. Food Technology Batch 2014 onwards

Semester third

Corse Code	Course Title	Load Allocation			Marks Distribution		Total	Credits
		L	T	P	Internal	External		
BTFT 301	Principles of Food Preservation	3	-	-	40	60	100	3
BTFT 302	Food Chemistry	3	-	-	40	60	100	3
BTFT 303	Food Microbiology	3	1	-	40	60	100	4
BTFT 304	Fluid flow operations and Rheology	3	1	-	40	60	100	4
BTFT 305	Fruits and Vegetable Processing Technology	3		-	40	60	100	3
BTFT 306	Food Hygiene and Plant Sanitation	3		-	40	60	100	3
BTFT 307	Principles of Food Preservation (Lab)			2	30	20	50	1
BTFT 308	Food Chemistry (Lab)			2	30	20	50	1
BTFT 309	Food Microbiology (Lab)	-	-	2	30	20	50	1
BTFT 310	Fruits and Vegetable Processing Technology (Lab)			2	30	20	50	1
	TOTAL							24

Semester Fourth

Course Code	Course Title	Load Allocation			Marks Distribution		Total	Credits
		L	T	P	Internal	External		
BTFT 401	Food Biochemistry and Nutrition	3		-	40	60	100	3
BTFT 402	Milk and Milk Products Technology	3		-	40	60	100	3
BTFT 403	Food Additives	3		-	40	60	100	3
BTFT 404	Heat and Mass Transfer	3	1	-	40	60	100	4
BTFT 405	Cereals and Pulses Processing Technology	3		-	40	60	100	3
BTFT 406	Process Instrumentation and control	3	1	-	40	60	100	4
BTFT 407	Food Biochemistry (Lab)			2	40	60	100	1
BTFT 408	Milk and Milk Products Technology (Lab)			2	30	20	50	1
BTFT 409	Heat and Mass Transfer (Lab)	-	-	2	30	20	50	1
BTFT 410	Cereals and Pulses Processing Technology (Lab)	-	-	2	30	20	50	1
	TOTAL							24

SEMESTER

THIRD

FT 301: Principles of Food Preservation

3L+1T

Unit I:

Basic consideration: Aim and objectives of preservation and processing of foods, Constituents of foods: Properties and significance; Nutritive aspects of food constituents; Concept of Water activity, osmosis and diffusion, Food Spoilage: Microbial, Physical, Chemical & Miscellaneous; Intermediate moisture Food

UNIT-II:

Preservation of foods by low temperatures

Considerations relating to storage of foods at low temperature, controlled and modified atmosphere storage of foods, Freezing process, freezing curve, slow and fast freezing of foods and its consequences, other occurrences associated with freezing of foods. Technological aspects of frozen storage and thawing of foods, freeze concentration.

UNIT-III

Preservation of foods by high temperature: Basic concepts in thermal destruction of micro-organisms-D, Z, F, values Heat resistance and thermophiles in micro-organisms. thermal processing of foods : Cooking, blanching, pasteurization and sterilization of foods, canning and spoilages in canned foods.

UNIT-IV

Preservation by water removal: Principles, technological aspects and applications of evaporative concentration processes, and membrane processes for food concentrations. Principles, technological aspects and applications of drying and dehydration of foods

Preservation by chemical:Use of preservative in foods: chemical and biopreservative including antibiotics, antimicrobial agents.

Books Recommended:

1. The Technology of Food Preservation by Desrosier & Desrosoer
2. Food Science by N.N.Potter
3. Food Processing Technology Principles & Practices by P J Fellows
4. Principles of Food Preservation by V.Kyzlink,Elsevier Press.
5. Modern Food Microbiology by James M.Jay, D.Van Nostrand.

FT 302: Food Chemistry

3L

Unit I:

Introduction: Development of food chemistry and its role in food processing.

Water: Importance of water in foods. Structure of water & ice. Concept of bound & free water and their implications.

Carbohydrates: Nomenclature and classification, structure, physical and chemical properties of carbohydrates – monosaccharide, disaccharides and polysaccharides (cellulose, starch, fructans, galactans, hemi-cellulose, pectic substances) and their functions; dietary fiber, changes in carbohydrates during processing.

Unit II:

Proteins: Nomenclature, classification, structure, chemistry and properties of amino acids, peptides, proteins. essential and non- essential amino acids. Changes during processing.

Unit III

Lipids: Structure, classification, physical and chemical properties of fatty acids and glycerides, Auto-oxidation, photo oxidation and flavor reversion, Changes in fats & oils during processing.

Vitamins & Minerals: Types, chemistry and functions, source and deficiency diseases. Changes during processing

Unit IV:

Enzymes: Nomenclature, mechanism of enzyme action, factors affecting enzyme action, enzymes important in foods.

Pigments: Structure and properties of chlorophyll, anthocyanins, tannin, myoglobin and carotenoids, chemical changes during processing

Books Recommended

- 1) Food Chemistry by Meyer
- 2) Food Chemistry by Belitz
- 3) Food Chemistry by Lee
- 4) Principles of Biochemistry by Lehniger

FT 303: Food Microbiology

3L+1T

Unit I:

Introduction: Importance and historical developments in food microbiology, prokaryotic and eukaryotic cell, morphology, structure, microbiology and reproduction of Bacteria, Yeast, Mold, Actinomycetes and algae. Viruses-structure and replication with particular reference to food borne viruses.

Unit II:

Microbial growth and death kinetics: Definition, Growth curves (different phases), synchronous growth, doubling/generation time, intrinsic and extrinsic factors, relationship between number of generations and total number of microbes.

Techniques of pure culture: Definition, Serial Dilution, pour plate, streak plate, spread plate, slant, broth and enrichment culture, lyophilization.

Unit III:

Microorganism in Natural Products: Sources and prevention of contamination; Microbiology of atmosphere, water, influence of aw, milk and milk products; cereals and cereal products; meat and meat products; fish or fish products; poultry and eggs; sugars; spices and salt; canned foods.

Unit IV:

Food spoilage: Bacterial and fungal food spoilage, food poisoning, food borne infection, food borne intoxication. Toxins produced by staphylococcus, clostridium, aspergillus; bacterial pathogens-salmonella, bacillus, listeria, E. coli, shigella, campylobacter.

Microbial Control: Source of microorganism, Physical and chemical agents used in microbial control, disinfection agents and its dynamics.

Books Recommended

1. Microbiology by H.J. Pelczar, Smith & Chan.
2. Food Microbiology by Frazier
3. Industrial Microbiology by Casida
4. Introduction to Microbiology by Stainier.

FT 304: FLUID FLOW OPERATIONS AND RHEOLOGY

3L+1T

UNIT-I

Introduction to fluid, various physical properties of fluid, concept viscosity, units of viscosity, factors affecting the rheological parameters, fluid pressure and its measurement, pressure, manometers, concept of Reynolds's number, types of fluid flow, rate of flow or discharge, derivation of continuity equation, different types of energies of a liquid in motion, pressure energy, kinetic energy, potential head, derivation Bernoulli equation, hydraulic coefficients.

UNIT-II

Practical applications of Bernoullies equation, venturimeter, orifice meter, pitot tube, rotameter, loss of head due to friction in viscous flow, Darcy-Weisbach formula; energy losses in pipes; major losses; minor losses; coefficient of friction or fanning friction factor or skin friction factor; drag coefficient; different types of pumps.

UNIT-III

Introduction to Rheology; perfectly elastic (Hookean body), ideal plastic behaviour; ideal viscous behaviour; stress strain diagram of a biomaterial; rheological diagram; concept of apparent viscosity, time independent fluids (no memory fluids); power law (viscous) fluids; pseudo plastic or shear thinning fluids; shear thickening fluids; dilatant fluids; viscoplastic fluids: Bingham plastic (ideal plastic) fluids; non- bingham plastic fluids; Herchel-Bulkley fluids: Time dependent fluids (memory fluids) like thixotropic fluids; antithixotropic (or rheopectic) fluids.

UNIT-IV

Derivation of Hagen-Poiselle equation or theory of capillary viscometer; Stokes law; Viscometry, capillary tube viscometer; ostwald viscometer; falling sphere resistance method; rotational viscometer; cone and plate type viscometer; circular disc viscometer; oscilatory measurements method; textural profile analysis.

Books Recommended

- 1) G. S. Sawhney, Fundamentals of Fluid Mechanics. I.K. International Publishing House Pvt. Ltd, new Delhi, 2008
- 2) Bansal R. K A Text book of Fluid Mechanics and Hydraulic machines. Laxmi Publications (P) Ltd, New Delhi, 2009

- 3) Shiv Kumar Fluid Mechanics. Ane Books Pvt. Ltd, New delhi, 2010
- 4) Arora K. R Fluid Mechanics Hydraulic and Hydraulic machines, Standard Publishers Distributors, New Delhi 1993

FT 305: FRUIT AND VEGETABLE PROCESSING TECHNOLOGY

3L

UNIT-I

Current status of production and processing of fruits and vegetables. Structural, compositional and nutritional aspects. Post-harvest physiology, handling, losses and conservation of fruits and vegetables.

UNIT-II

Techniques of extension of shelf life of unmodified produce: use of adjuncts, novel packaging, controlled and modified atmosphere storages. Processing for conversion into products and preservation by use of chemical preservatives, chilling & freezing, sterilization & canning, concentration & dehydration and other special techniques.

UNIT-III

Technology of Products: juices & pulps, concentrates & powders, squashes & cordials, nectars, fruit drinks & beverages carbonated and its quality control. Fermented products (Cider, wine, brandy).

UNIT-IV

Jam, Jelly & Marmalades; candied fruits, dried fruits and fruit products (eg. Aam papads, bars); soup mixes; sauces & ketchups; puree & pastes; chutneys & pickles, Specialty fruit and vegetable products, Waste management in fruits & vegetable industry

Books Recommended

1. Food science by B.Srilakshami;New Age International.
2. Fundamentals of Foods and Nutrition by R. Madambi & M.V. Rajgopal.
3. Foods :Facts and Principles by N Shakuntala manay;New Age International (P) Ltd.
4. Preservation of Fruits and Vegetable by Girdhari lal and Sidappa; CBS Publications

5. Food Science and Processing Technology, Vol., 2 by Mridula and Sreelata
6. Food Preservation by Sandeep Sareen
7. Fruit and Vegetable Preservation by Shrivastava and Kumar.
8. Post-Harvest Physiology & Handling of Fruits & Vegetables by Wills, Lee, Graham, McGlasson & Hall (AVI)
9. Literature from Spice Board of India, etc.

FT 306: FOOD HYGIENE AND PLANT SANITATION

3L

UNIT-I

General principle of food hygiene, Hygiene in rural and urban areas in relation to food preparation, personal hygiene and food handling habits. Sanitary aspects of building and processing equipment. Establishing and maintaining sanitary practices in food plants.

UNIT-II

Safe and effective insect and pest control: Extraneous materials in foods, Principles of Insects and pest control. Physical and chemical control, Food contamination by microorganisms, effective control of micro-organisms, importance in food sanitation, micro-organisms as indicator of sanitary quality.

UNIT-III Sanitary aspects of water supply: Source of water, quality of water, water supply and its uses in food industries. Purification and disinfection of water preventing contamination of potable water supply.

UNIT-IV

Effective detergency and cleaning practices: Importance of cleaning technology, physical and chemical factors in cleaning, classification and formulation of detergents and sanitizers, cleaning practices. Role of sanitation, general sanitary consideration and sanitary evaluation of food plants. Sanitary aspects of waste disposal.

Books Recommended:

1. Principles of Food Sanitation by Marriott and Norman, G.
2. Hygiene and Sanitation in Food Industry by S. Roday, TMH
3. Guide to Improve Food Hygiene by Gaston and Tiffney, TMH.
4. Practical Food Microbiology & Technology by Harry H. Weiser, Mountney, J. and Gord, W.W.
5. Food Poisoning and Food Hygiene by Betty C. Hobbs, London publication.

FT 307: PRINCIPLE OF FOOD PRESERVATION (LAB)

1. Demonstration of various food processing equipment
2. Determination of moisture content of food sample by oven method
3. Determination of the ash content of food sample
4. Determination of total soluble solids of various food samples
5. Determination of pH of different food samples
6. Measurement of acidity by titration method
7. Assessment of adequacy of blanching of food sample (potato & apple)
8. Measurement of specific gravity of liquid sample
9. Identification of different food grains
10. Measurement of cooking quality of rice grains
11. Preparation of the sugar syrup of different degree brix
12. Preservation of vegetable with the help of fermentation technique (Sauerkraut)
13. Studies on the effect of boiling time on egg quality

FT 308 FOOD CHEMISTRY LAB

1. Qualitative tests for the presence of carbohydrates in food samples
2. Qualitative test for the presence of protein in food samples
3. Estimation of sugar in given food sample by Lane and Eynon and Nelson & Somogy method
4. Estimation of lactose in milk sample by titrimetric method
5. Determination of acid value of given oil or fat sample
6. Estimation of amount of fat in milk powder by Majonnier's method
7. Estimation of protein by micro-Kjeldhal method
8. Estimation of pectin in fruit (Guava)
9. Determination of saponification value and un-saponifiable matter
10. Determination of RM value of oil and fat.
11. Determination of Polenske value of oil and fat.
12. Determination of vitamin C in food sample.
13. Estimation of phosphatase activity.

FT 309: Food Microbiology Lab

1. Working study of various equipments related to Microbiology.
2. Isolation of pure culture using pour plate technique.
3. Isolating pure culture using spread plate technique.
4. Measurement the size of given microbial cell using micrometry.
5. Enumeration total viable count in a culture.
6. To perform Gram staining technique of bacteria.
7. Study the growth curve of microorganisms.
8. Quantitative analysis of food sample by standard plate count (SPC) method.
9. Study the quality of milk by methylene blue reductase test.
10. Preparation of curd using starter culture.
11. To perform presumptive test for coliforms in milk.
12. To study the microbial spoilage of given food sample.

FT 310: FRUITS & VEGETABLES PROCESSING TECHNOLOGY (LAB)

1. Preservation and processing of certain vegetables by drying.
2. Preparation of tomato ketchup and its preservation.
3. Preparation of tomato puree and its preservation.
4. Preparation of pickles.
5. Preparation of jam,
6. Preparation of jelly
7. Preparation of marmalades
8. Preparation of squash and cordial as per FPO specification.
9. Processing and Preservation of peas by use of high temperatures (Bottling of Peas).
10. Blanching of a given sample (pea) and assessment of its adequacy.
11. Enzymatic browning of fruits and vegetables and its control.
12. Osmotic dehydration of given sample (Carrot/Grapes).
13. Preparation of amla preserve and dried fruit product (Aam papad, bars)