University of Lucknow, Lucknow
M.Sc. Food Processing and Food Technology

Semester-IV

Course No.	Name of the Course	Credit	Remark
FPTCC-401	Food Quality and Food Safety Regulations	04	Core Course
FPTEL-401A	Technology of Bakery and Confectionery	04	Elective
FPTEL-401B	Technology of Spices and Condiments		
FPTEL-402A	Food Chemistry	04	Elective
FPTEL-402B	Sensory Evaluation		
FPTMT-401	Dissertation (from Industry/ Institution/ R & D Lab), Evaluation and Viva-voce	08	Master Thesis
FPTIRA-401	Enzymes in Food Processing	04	Intradepartmental Course
	Semester Total	**24**	

FPTCC-401: Food Quality and Food Safety Regulation 04 Credit

Course Outcome:

- Student will get knowledge about concept of quality management and quality management systems in India
- To know the importance and functions of quality control
- To know the food safety and standard act, various organizations, traceability and certification

Unit I

Concept of quality; Quality attributes- physical, chemical, microbial, sensory and their significance in food industry.

Unit II

Concepts of quality management: Objectives, importance and importance and functions of quality control; Quality management systems in India; Sampling techniques and plans;

Unit III

Food safety and Standards Act, 2006; Domestic regulations; Global Food Safety Initiative; Various organizations dealing with inspection, traceability and authentication, certification and quality.

Unit IV

Quality assurance, Total Quality Management; GMP/GHP; GLP, GAP; Sanitary and hygienic practices; HACCP; Quality manuals, documentation and audits; Indian & International quality systems and standards like ISO and Food Codex.

Unit V

Export import policy, export documentation; Laboratory quality procedures and assessment of laboratory performance; Applications in different food industries; Food Safety, IPR and Patent.

References

1. Food Quality and Standards - Volume I, Radomir Lasztity
2. Food Quality Assurance: Principles and Practices, Inteaz Alli
3. Quality Assurance for the Food Industry By (A practical Approch) by J. Andres Vosconcellons
4. Food quality and Safety by P. K Jaiswal, CBS Publisher
5. Food Safety and quality by Edmund Parker, Larsen & Keller Education
6. The Food Safey and standard Acts -2006 12 th edition by Virag Gupta
7. Food Safety and Inspection an introduction by Madelene Smith, Routledge
8. International Standards for Food safety by Naom Rees David Watsan, Springer
9. Intellectual Property Rights by Khusdeep Dharni and Neeraj Pandey PHI Larning
10. Food Safety Management by Yashmeen Motaarjemi and Huub Lelieveld, Academic Press

FPTEL-401A: Technology of Bakery and Confectionery 04 Credit

Corse Outcome:

- Students of can learn the art of professional baking.
- To know the art of baking includes techniques and right tips for Baking breads to cookies.
- For creating various cakes and Pastries and other snacks.
- This course will make students ready to start your career in the field of bakery.

Unit I

Principles of Baking, Raw Material and their Role – flour, leavening agents, sugars, fats, additives, spice. Types of bakery products and technology for their preparation – dough and batters; cakes, pies, pastries, bread, biscuits.

Unit II

Quality Parameters of Bakery Products - chemistry of dough and batters; rheological testing and interpretation of data; sensory evaluation. Staling and Nutrient Losses in Bakery Products. Sanitation and Hygiene in a Bakery, Equipment used in the Bakery Industry

Unit III

Principles of Confectionery preparation, Raw Material and their Role – interfering agents, inversion of sugars, etc. Types of Confectionery Products and Technology for their preparation.

Unit IV

Quality Parameters of Confectionery Products Nutrient and other Losses in Confectionery Products Sanitation and Hygiene in a Confectionery Equipment used in the Confectionery Preparation of Indian Confectioneries.

Unit V

Sugar – raw material, types, and preparation, Chocolate – raw material, types, and preparation. Chewing Gum - raw material, types, and preparation, Lozenges - raw material, types, and preparation, Pan Coating – hard and soft panning; problems in coating; glazing, polishing, and tableting, Nutritional value, quality parameters

References

1. Technology of Biscuits, Crackers & Cookies. Second Edition. Manley D. CRC Press.
2. Basic Baking. Dubey SC. The Society of Indian Bakers, New Delhi.
3. Encyclopedia of Food Science & Technology. Francis FJ. Wiley John Wiley & Sons.
4. Bakery Science & Technology. Third Edition. Vols. I, II. Pyler EJ. Sosland Publ.
5. Flat Bread Technology. Qarooni J. Chapman & Hall, Springer
6. Bakery Products: Science and Technology, by Y.H. Hui, Harold Carke, Ingrid De Leyn
7. Textbook of Bakery and Confectionery 2nd Edition, by Yogambal Ashok Kumar, Prentice Hall India Learning Pvt Ltd..

FPTEL-401B: Technology of Spices and Condiments 04 Credit

Course outcome:

- To understand the status of spice industry in India and learn the technologies of spices and condiments.
- To know more about innovations in this area of food processing.
- To get the knowledge of quality assurance mechanism in spices.
- Status of world trade and product traded.

Unit I

Major spices: Pepper, cardamom, ginger, chili and turmeric, Oleoresins and essential oils; method of preparation, chemistry of the volatiles, enzymatic synthesis of flavour identical.

Unit II

Other spices: Cumin, coriander, cinnamon, fenugreek, garlic, mace, clove & mint, Vanilla, present trends in synthesis of volatiles, microbial and chemical contaminants, Plant suspension cultures,

Unit III

Coffee: Occurrence, chemical constituents,harvesting, fermentation of coffee beans, changes taking place during fermentation, drying; roasting, process flow sheet for the preparation of coffee powder, instant coffee technology, chicory chemistry; quality grading of coffee

Unit IV

Quality assurance mechanism in spices, Quality maintenance of Indian spices, fumigation irradiation of spices, classification of spices based on the economic importance, classification of spices based on the plant parts used.

Unit V

Organic spices, developing organic spices, certification of organic spices value added spices products (spice oil, oleoresin, curry powder etc.) world trade in spices – present status, forms of spices and products traded

References

1. Spices condiments and seasonings by Kenneth T. Farrell Springer II edition.
2. Spices and condiments by Bramha Prakash Pandey, Shree Publishuing House.
3. Handbook of herbs and spices by K V Peter Woodhead publications.
4. Spices and Condiments by J S Pruthi, National Book Trust.
5. Hand book on Spices and condiment, H Panda Asia Pacific Buisines Press.
6. Indian Spices, Amit Baran Sharangi Springer.

FPTEL-402A: Food Chemistry 04 Credit

Course Outcome:

- To understand the chemistry of water and its significance in foods
- To know the role of each component of food such as carbohydrates, proteins, fats, vitamins and minerals and their interaction.
- To understand the functional aspects of various food components and to study their role in food processing.
- To understand the enzyme activity in different food systems and their functional importance in preparation of food additives.

Unit I

Water molecule, hydrogen bonding, different types of water, physical properties of water, water activity and its role in food processing and storage, industrial and nutritional significance of water.

Unit II

Carbohydrates: Role of carbohydrates in food industry, sugars starch, cellulose, glucans, hemicellulose, gums, pectic substances, polysaccharides. Plant pigments and their role in food industry. Proteins: Major protein systems and factors affecting them, the nature of interaction in proteins derived from milk. egg proteins, meat proteins, fish muscle proteins, oil seed proteins and cereal proteins.

Unit III

Lipids: Refining of crude oils, hydrogenation and winterization. Vegetables and animal fats, margarine, lard, butter,oleo oil and their use in cooking, frying and shortening. Flavour changes in fats and oils. Lipid oxidation, factors affecting lipid oxidation, autooxidation, biological significance of auto-oxidized lipids.

Unit IV

Enzymes: Enzyme activity in different food systems, commercial availability, food enzyme technology, immobilization of enzymes, removal of toxicants through enzymes, flavour production by enzymes. Vitamins: Role of vitamins in food industry, effect of various processing treatments and fortification of foods.

Unit V

Enzymatic and non enzymatic browning in foods. Additives, Emulsifiers, Antioxidants & their role in product preparation.

References

1. Principles of Food Chemistry by John deMan, Springer.
2. Food chemistry by H.K Chopra P.S Panesar, Alpha Science International Ltd.
3. Food chemistry by Owen R. Fennema, CRC Publications.
4. Food Chemistry by Lillian Hoagland Meyer, Reinhoad Publishing Corporation.
5. Food theory and application second edition by Jane Bower, Pearson
6. Spices and Seasonings: A Food Technology Handbook, by Donna R. Tainter, Antony T.Grenis, Wiley
7. Handbook of Herbs and Spices: Volume 3 edited by K.V. Peter Woodhead Publishing

FPTEL-402B: Sensory Evaluation 04 Credit

Course outcome:

- To get the knowledge of texture, flavour measurement and other sensory characteristics of food and consumer products for quality assurance.
- To understand the factors influencing sensory measurements and sensory quality parameters
- Students will know about different tests for sensory evaluation of food
- To gain knowledge about sensory evaluation of different food products.

Unit I

Definition of sensory evaluation, Importance of sensory evaluation, general testing conditions i.e.Testing area, testing setup, Lighting setup, Testing schedule; Preparation of Samples: Coding and order of presentation, Types of panels-trained and consumer panels, Evaluation card preparation.

Unit II

Selection of sensory panellists; Factors influencing sensory measurements; Sensory quality parameters -Size and shape, texture, flavour, aroma, taste, colour, temperature sensation

UNIT III

Sensory testing of foods: Threshold tests, Difference tests, Ranking tests, Hedonic tests, Acceptance and preference tests, Scoring test, Sensitivity tests

UNIT IV

Methods of sensory evaluation of different food products: milk and milk products, fruit and vegetables, cereal products, confectioneries and chocolates, coffee and tea, spices

References

1. Sensory Evaluation of Food - Theory and Practice. Jellinek G. Ellis Horwoood
2. Principles of Sensory Evaluation ofFood. Amerine MA, Pangborn RM & Rossles EB. Academic Press
3. Sensory Science Theory and Applicatons in Foods. Lawless HT & Klein BP. Marcel Dekker.
4. Applied Sensory Analysis of Foods. Vols. I, II. Maslowitz H. CRC Press
5. Food Science. 5th ed. Potter NN & Hotchleiss JH. CBS
6. Sensory Evaluation of Foods. Piggot JR. Elbview Applied Science Publ.
7. Sensory Evaluation of Agricultural Products. Rai SC & Bhatia VK.. IndianAgricultural Statistics Research Institute (ICAR).
8. Basic Sensory Methods for Food Evaluation. Watts CM, Ylimaki CL, Jaffery LE & Elias LG. Int. Dev. Res. Centre, Canada.
9. Sensory Evaluation Practices. Stone H & Sidel JL.Academic Press
10. Sensory Evaluation Techniques 4th edition, by Morten C. Meilgaard Gail Vance Civille B. Thomas Carr CRC Press
11. Sensory Evaluation of Food: Principales and Practices by Harry T. Lawless, Hildegarde Heymann

FPTMT-401: Dissertation (from Industry/ Institution/ R&D Lab), Evaluation and Viva-voce 08 Credit

Course Outcome:

- Students go to food Industries/Institutions/R&D Laboratory associated with food processing, preparation, food quality, food safety etc. and get deep knowledge about techniques related to food.
- During their tenure, students work in real environment and thus after completion of their dissertation they become equipped with qualities of food technologists and can develop their own entrepreneur.

FPTIRA-401: Enzymes in Food Processing 04 Credit

Course Outcome:

- To develop an understanding of enzymes, properties and enzyme kinetics.
- To get understanding of production of protein hydrolysates and bioactive peptides, corn syrups.
- To know the role of enzymes in cheese making, baking, fruit juices, meat tenderization and egg processing
- Students will know the enzyme processing for production of flavour and flavour enhancers

Unit I

Enzymes- Definition, classification, properties, characterization and factors affecting enzyme catalyze reactions and kinetics; production of enzymes (amylases, proteases, cellulases, pectinases, xylanases, lipases) used in food industry and their downstream processing. Immobilized enzyme system and application.

Unit II

Enzymes for production of protein hydrolysates and bioactive peptides, maltodextrins and corn syrup solids (liquefaction, saccharification, dextrinization, isomerisation for production of high fructose-corn-syrup), fructose and fructo-oligosaccharides.

Unit III

Enzymes as processing aids: Role of enzymes in cheese making and whey processing, fruit juices-cell wall degrading enzymes for liquefaction, clarification, peeling, debittering, decolorization of very dark colored juices;

Unit IV

Enzymes in baking (fungal α- amylase for bread making; maltogenic α- amylase for anti-staling; xylanses and pentosanases as dough conditioners; Amylases, proteases and lipases, for dough conditioning; oxidases as replacers of chemical oxidants; synergistic effect of enzymes); meat tenderization; egg processing.

Unit V

Enzymes processing for flavours (enzyme- aided extraction of plant materials for production of flavours enhancers such as nucleotides; flavours from hydrolyzed vegetable/animal protein); Role of enzymes in food industry, enzymatic approach to tailor- made fats.

References

1. Enzymes in Food Processing, by Gregory A. Tucker, L.F.J. Woods, Springer Publication
2. Enzymes in Food Technology by Robert J. Whitehurst, Maarten Van Oort, Wiley-Blackwell Publication
3. Microbial Enzyme Technology in Food Application, Ramesh C Ray, Cristina E Russel, CRC Press
4. Enzyme in Food & Beverage Processing by Muthu Swami Chandra Shekharan, CRC Press
5. Handbook of Food Enzymology by John R. Whitaker, AGL Voragen and Domenic WS Wong, CRC Press
6. Enzyme in Industry Production and Application by Aehle.W,Wiley-VCH Verlag Gmbh & Co.
7. Lehninger Principle of Biochemistry by David L Nelson and Michael M Cox,W. H. Freeman
8. Novel Enzyme technology for food applicationsby Rastell R, Wood head publication