

College of Post Harvest Technology and Food Processing

Program outcome of B.Tech Food Technology

POs B.Tech Food Technology

- The students will get knowledge on various unit operations, backbone of all food processes.
- Knowledge on basic principles of thermal food processes, size reduction and separation operations involved in food processing and related equipment.
- This will help students to solve problems of post-production processes and will also enhance employability in food industries.
- Student's capability to mill and process (value added products) all kinds of horticultural crops as per requirement of food industries.

Course Outcome [B.Tech. -Food Technology]

B.Tech. (Food Technology)			
Semester	Course name	Course code	Course outcome
I	English Language	FBS 111	After completion of course, the students will be able to understand: <ol style="list-style-type: none">1. Importance of language and communication skills in the engineering profession.2. Proficiency in spoken and conversational English, including agreement, disagreement, likes, dislikes, and inquiries.3. Effective participation in debates and discussions.4. Application of basic English sentence patterns, including subject-verb agreement and proper use of pronouns, adjectives, adverbs, phrases, and clauses.5. Development of vocabulary, reading skills, note-taking, and composition abilities, including grammar tenses, voice-change, prepositions, word-formation, types of sentences, and writing various forms of communication.
	General Microbiology	FSQ 111	<ol style="list-style-type: none">1. Gain a comprehensive understanding of microbiology, including its evolution, scope, and historical significance.2. Acquire knowledge in microbial classification, nomenclature, identification, and the general methods used for classifying bacteria.3. Develop skills in microscopy, staining techniques, and the morphology and fine structure of bacteria,



			<p>as well as their cultivation and nutritional requirements.</p> <ol style="list-style-type: none"> 4. Explore the basics of microbial genetics; bacterial recombination, mutations, and the characteristics and modes of action of antibiotics. 5. Develop practical proficiency through hands-on experience in microscopy, sterilization, culture media preparation, staining methods, pure culture techniques, and identification procedures, while also learning about factors influencing microbial growth.
	Engineering Mathematics-I	FBS 112	<ol style="list-style-type: none"> 1. Develop a strong understanding of differential calculus, indeterminate forms, curvature, tracing of curves, partial differentiation, and maxima/minima. 2. Acquire proficiency in integral calculus, encompassing reduction formulae, rectification of standard curves, volumes and surfaces of revolution, double and triple integrals, and applications of integrals for area and volume calculations. 3. Gain expertise in solving ordinary differential equations, including exact and Bernoulli's equations, equations reducible to exact form, higher-order equations, and methods such as variation of parameters and series solutions. 4. Comprehend vector calculus, covering differentiation of vectors, scalar and vector point functions, the gradient, divergence, and curl of vector functions, as well as line, surface, and volume integrals, and theorems like Stoke's, divergence, and Green's theorems. 5. Apply mathematical concepts to engineering problems, demonstrating the ability to analyze and solve complex mathematical equations, and interpret physical interpretations of vector calculus operations.
	Engineering Drawing and Graphics	FBE 111	<ol style="list-style-type: none"> 1. Apply projection methods and create accurate working drawings from models and isometric views. 2. Demonstrate proficiency in dimensioning techniques, sectioning, and creating sectional drawings for machine parts. 3. Identify and represent different types of fasteners using appropriate symbols and conventional representations.

			<ol style="list-style-type: none"> 4. Understand CAD systems, their components, and the benefits of CAD in the design process. 5. Develop practical skills in manual drawing, isometric projection, sectional drawing, and CAD software (e.g., AutoCAD), including generating 2D drawings and completing small projects using CAD/CAM.
Basic Electrical Engineering	FBE 112		<ol style="list-style-type: none"> 1. Understand AC fundamentals, including concepts like cycle, frequency, amplitude, and laws of magnetic circuits. 2. Apply knowledge of AC series and parallel circuits, as well as R-L, R-C, and R-L-C circuits. 3. Comprehend 3-phase systems, star and delta connections, power measurement methods, and the principles and characteristics of transformers. 4. Gain proficiency in single-phase and poly-phase induction motors, including their construction, operation, torque equation, starting methods, and speed control. 5. Develop a solid understanding of DC machines, including generators and motors, their construction, operation, commutation, characteristics, and applications. Also, learn about electrical measuring equipment, wiring systems, protection devices, grounding, and the use of circuit protection devices.
Workshop Technology	FBE 113		<ol style="list-style-type: none"> 1. Understand and identify various engineering materials and their properties. 2. Follow safety measures and regulations in the workshop environment. 3. Gain proficiency in using measuring instruments and gauges, and comprehend heat treatment processes. 4. Acquire knowledge of different welding techniques, types of electrodes, and welding joints. 5. Develop skills in various workshop operations, including smithing, forging, carpentry, machining, and sheet metal work.
Crop Production Technology	FBS 113		<ol style="list-style-type: none"> 1. Gain knowledge of crop classification and the influence of weather parameters on crop growth. 2. Understand the principles of tillage, soil-water-plant relationship, crop rotation, and cropping systems. 3. Acquire practical skills in crop production techniques for major cereal crops, oilseeds, pulses, spices, cash crops, fruits, and vegetables.



			<ol style="list-style-type: none"> 4. Develop an understanding of nursery management for horticultural crops. 5. Apply crop production technology to effectively cultivate and manage major fruit crops and vegetable crops, considering factors such as varieties, sowing/transplanting methods, spacing, inter-culturing, fertilization, water requirements, harvest time, and yield potential.
	Environmental Sciences & Disaster Management	FBS 114	<ol style="list-style-type: none"> 1. Develop an understanding of the components and interrelationships within the environment, and the impact of technology and environmental degradation. 2. Comprehend the concepts of ecology, ecosystems, and their structure and function, including major ecosystems and their characteristics. 3. Gain knowledge of population dynamics, natural resources, and their influence on human settlement patterns, pollution, and food production. 4. Understand different types of environmental pollution (water, air, land, noise, and radioactive) and their effects, as well as waste management, recycling, and pollution control through law. 5. Stay informed about current global environmental issues like global warming, greenhouse effects, acid rain, and ozone layer depletion.
	Physical Education	PPE 111	<ol style="list-style-type: none"> 1. Understand the foundations and importance of physical education, including its objectives, history, and development. 2. Acquire knowledge and skills in various exercise techniques and training methods to improve physical fitness, flexibility, strength, endurance, power, agility, coordination, and balance. 3. Recognize different body mechanisms and body types and their implications in physical activities. 4. Learn about test and measurement methods used in physical education to assess physical fitness, motor skills, and cardiovascular efficiency. 5. Gain an understanding of recreational activities, sports governance, tournament organization, and coaching principles for skill development in major games and athletic events.
II	Food Chemistry of Macro-nutrients	FSQ 121	<ol style="list-style-type: none"> 1. Understand the role and types of water in foods, its functional properties, and the impact of moisture on food stability. 2. Gain knowledge of dispersed systems in foods

			<p>such as sols, gels, foams, and emulsions, and their rheological behavior.</p> <ol style="list-style-type: none"> 3. Explore the changes and modifications of carbohydrates, proteins, and lipids during cooking, processing, and storage of food. 4. Understand the chemistry of lipids/fats, including their role, crystallization, chemical reactions, rancidity, and the processing and safety considerations of oils and fats. 5. Acquire knowledge of enzymatic and chemical reactions in food components, such as carbohydrates and fats, and their impact on food quality and stability.
	Food Microbiology	FSQ 122	<ol style="list-style-type: none"> 1. Understand the importance of microorganisms in food science and their role in food spoilage. 2. Identify the factors that affect the growth and survival of microorganisms in food, including intrinsic and extrinsic factors. 3. Gain knowledge of the microbial changes and chemical reactions that occur in different food components. 4. Familiarize with the microbiology of various food categories, including milk, fruits and vegetables, cereals, meat, fish, poultry, sugar, salts, spices, and canned foods. 5. Understand the concept of shelf life and learn about foodborne intoxications and infections, including their types, symptoms, and associated environmental conditions.
	Food Thermodynamics	FPE 121	<ol style="list-style-type: none"> 1. Understand the principles of thermodynamics as applied to food systems. 2. Analyze energy transfer and conversion in food processes using the first and second laws of thermodynamics. 3. Comprehend the behavior of pure substances in different phases and conditions. 4. Apply thermodynamic cycles to food-related systems, such as power and refrigeration cycles. 5. Utilize psychrometry to analyze properties of moist air and steam in food processes.
	Computer Programming and Data Structures	FBE 122	<ol style="list-style-type: none"> 1. Learn the basics of computer programming and the evolution of computer technology. 2. Understand the structure and syntax of the C programming language.

			<ol style="list-style-type: none"> 3. Acquire skills in writing programs using control structures, arrays, strings, functions, and file operations. 4. Gain knowledge of high-level programming concepts and the importance of documentation. 5. Familiarize oneself with data structures like stacks, queues, and linked lists for efficient problem-solving.
	Fluid Mechanics	FPE 122	<ol style="list-style-type: none"> 1. Understand the properties and behavior of fluids, including their pressure and flow characteristics. 2. Learn how to measure and analyze pressure using different devices. 3. Study the principles and applications of fluid flow, including laminar and turbulent flow, Bernoulli's theorem, and flow through pipes, orifices, and weirs. 4. Develop skills in calculating important parameters such as discharge, velocity, and head loss in fluid systems. 5. Gain knowledge of dimensional analysis, hydraulic similitude, and the operation of pumps and turbines in fluid mechanics.
	Basic Electronics Engineering	FBE 123	<ol style="list-style-type: none"> 1. Understand semiconductor devices and their characteristics. 2. Analyze and design basic electronic circuits. 3. Apply Boolean algebra and digital logic techniques. 4. Demonstrate proficiency in transistor circuit analysis and amplifier biasing. 5. Acquire knowledge and skills in instrumentation and measurement techniques.
	Engineering Mathematics-II	FBS 121	<ol style="list-style-type: none"> 1. Understand and solve linear equations using matrix operations and transformations. 2. Apply complex variable theory to analyze functions, including limits, derivatives, and harmonic functions. 3. Comprehend Fourier series and its convergence, and analyze periodic functions. 4. Solve partial differential equations, including linear equations with constant coefficients and non-linear equations. 5. Apply the concepts of eigenvalues, eigenvectors, and diagonalization to linear transformations.
	Post Harvest Engineering	FPE 123	<ol style="list-style-type: none"> 1. Understand and apply the principles of post-harvest technology to reduce losses in food production.

			<ol style="list-style-type: none"> 2. Acquire knowledge of water activity, moisture control, and their impact on food quality. 3. Develop skills in post-harvest handling operations such as cleaning, sorting, grading, and separation. 4. Gain proficiency in the design, operation, and maintenance of machinery and equipment used in drying, parboiling, and milling processes. 5. Understand material handling systems and be able to select and design appropriate conveying equipment for grains, fruits, and vegetables.
	NCC/NSS	NCC 124 / NSS 124	<ol style="list-style-type: none"> 1. Develop an understanding of national problems and the socio-economic structure of Indian society. 2. Familiarize with the philosophy and principles of the National Service Scheme. 3. Acquire practical skills in functional literacy, awareness programs, and non-formal education for rural youth. 4. Gain knowledge of consumer rights, environment conservation, health, family welfare, and nutrition. 5. Understand the importance of the Right to Information Act in promoting transparency and accountability.
III	Fundamentals of Food Processing	FPT 211	<ol style="list-style-type: none"> 1. Gain knowledge of the sources, types, and perishability of foods, as well as the causes and types of food spoilage. 2. Understand the scope and benefits of food preservation and various methods used, including salt and sugar preservation, heat treatment, low-temperature preservation, drying and dehydration, irradiation, chemical preservation, and fermentation. 3. Familiarize with the principles, equipment, and techniques involved in different food preservation methods. 4. Learn about non-thermal preservation processes such as pulsed electric field, pulsed intense light, ultrasound, dielectric heating, ohmic and infrared heating, high-pressure processing, and microwave processing. 5. Develop an understanding of quality tests and shelf-life assessment for preserved foods, ensuring the maintenance of food quality and safety.
	Processing Technology of Liquid Milk	FPT 212	<ol style="list-style-type: none"> 1. Understand the history, production, and utilization of milk in India. 2. Gain knowledge of the composition, properties,

			<p>and different types of milk products.</p> <ol style="list-style-type: none"> Learn about the processing techniques and methods for collecting, preserving, processing, packaging, and storing liquid milk and its various products. Acquire an understanding of the biochemical changes during the manufacturing of fermented milk products and their impact on product quality. Familiarize with the detection of milk adulterations, prevention of quality defects, and operation of equipment used in milk processing, emphasizing hygienic design and corrosion control.
	Processing Technology of Cereals	FPT 213	<ol style="list-style-type: none"> Understand the importance and potential of cereals and millets as food sources. Gain knowledge of the properties and composition of cereals and millets. Learn about the processing techniques used in the milling and processing of different cereals, including paddy, wheat, corn, barley, oat/rye, sorghum, and millets. Understand the factors influencing the quality of milled products and flour, and their suitability for various food applications. Familiarize with the processing of secondary and tertiary cereal products, by-products, infant foods, and breakfast cereals.
	Industrial Microbiology	FSQ 211	<ol style="list-style-type: none"> Understand the historical development and significance of industrial microbiology in various industries. Gain knowledge about the primary and secondary metabolites produced by microorganisms and their industrial applications. Learn the techniques for screening and preservation of microorganisms used in industrial processes. Understand the principles and techniques of industrial sterilization, including media heat sterilization and the design of sterilizing equipment. Familiarize with the components and types of fermentors, the production of industrially important secondary metabolites, probiotics, bacteriocins, microbial enzymes, and the downstream processing steps such as cell disruption, extraction, purification, and product



			recovery.
Food Chemistry of Micronutrients	FSQ 212		<ol style="list-style-type: none"> 1. Understanding flavor: Students will gain knowledge of the chemistry of food flavor, including the assessment of flavor, flavoring compounds, and technologies for flavor retention. 2. Studying pigments: Students will learn about the pigments found in animals and plants, their behavior during processing, and techniques for retaining natural colors in food. 3. Exploring colorants: Students will understand the use of food colorants and regulatory dyes, as well as factors affecting color losses during thermal processing. 4. Analyzing vitamins and minerals: Students will gain knowledge of the requirements, enrichment, losses, and strategies for optimizing and retaining vitamins and minerals in food. 5. Enzymes in food industry: Students will learn about the role of enzymes in food, their use as processing aids, and their impact on food quality.
Heat and Mass Transfer in Food Processing	FPE 211		<ol style="list-style-type: none"> 1. Students learn about the basic principles of heat transfer processes in food processing, including conduction, convection, and radiation. 2. Students learn about one-dimensional steady-state conduction and its application in solving heat flow problems through different materials and geometries. 3. The concept of extended surfaces (fins) and their effectiveness in heat dissipation is introduced. 4. The course explores convection heat transfer, both forced and free, and teaches dimensional analysis for correlating variables affecting convection. 5. Students also study heat exchangers and their design, as well as mass transfer phenomena such as diffusion and evaporation, with applications in the dairy and food industry.
Unit Operations in Food Processing-I	FPE 212		<ol style="list-style-type: none"> 1. Understand principles of size reduction and its equipment, including crushers, mills, grinders, and cutting machines. 2. Gain knowledge of mixing theory and equipment for solids and liquids, and understand criteria for effective mixing. 3. Study mechanical separations, such as centrifugation and filtration, including theory,

			<p>equipment, and applications.</p> <ol style="list-style-type: none"> 4. Explore membrane separation methods, including ultrafiltration and reverse osmosis, and their applications in food processing. 5. Learn about additional separation methods like electro-dialysis, gel filtration, ion exchange, per-evaporation, and microfiltration in the context of food processing.
	Statistical Methods and Numerical Analysis	FBS 211	<ol style="list-style-type: none"> 1. Apply statistical methods, including hypothesis testing, significance testing, correlation, regression, and analysis of variance (ANOVA). 2. Develop proficiency in numerical analysis techniques, such as interpolation, numerical integration, and solving ordinary differential equations. 3. Understand Laplace transforms and their application in solving ordinary and simultaneous differential equations. 4. Gain knowledge of experimental designs, including completely randomized design, randomized block design, Latin square design, and response surface methodology. 5. Acquire skills in data analysis, interpretation, and experimental design for statistical and numerical analysis applications.
IV	Processing Technology of Dairy Products	FPT 221	<ol style="list-style-type: none"> 1. Understand the processing technology of various dairy products such as butter, butter oil, ghee, paneer, cheese, ice cream, condensed milk, dried milk, and traditional Indian dairy products. 2. Gain knowledge of their compositions, processing steps, equipment used, and quality testing. 3. Learn about common defects that can occur during processing, their causes, and prevention methods. 4. Understand the packaging and storage requirements for different dairy products. 5. Explore the utilization of by-products from the dairy industry.
	Processing Technology of Legumes and Oilseeds	FPT 222	<ol style="list-style-type: none"> 1. Understand the morphology, classification, and nutritional composition of legumes and oilseeds. 2. Gain knowledge of milling methods for pulses and oilseeds, including machines used, milling quality, efficiency, and factors affecting milling. 3. Learn about the removal of anti-nutritional compounds and nutritional changes during soaking and sprouting of pulses. 4. Understand cooking quality and methods for

			<p>legumes, including quick cooking and instant options. Explore soybean milk processing, fermented legume products, and oilseed milling methods.</p> <p>5. Gain knowledge of oil refining techniques, utilization of oilseed meals, and value addition of by-products from pulse and oil milling.</p>
	Food Biochemistry and Nutrition	FSQ 221	<p>1. Understand the biochemical aspects of carbohydrates, proteins, lipids, nucleic acids, vitamins, minerals, and enzymes.</p> <p>2. Gain knowledge of nutrition concepts, including water and energy balance, diet formulation, and assessment of nutritional status.</p> <p>3. Learn about the functions of food, basic food groups, and nutrient metabolism in the human body.</p> <p>4. Understand the metabolism of carbohydrates, lipids, and proteins, including their breakdown and synthesis processes.</p> <p>5. Gain knowledge of minerals, vitamins, and hormones in relation to nutrition, and understand the physicochemical and nutritional changes that occur during food processing treatments.</p>
	Unit Operations in Food Processing-II	FPE 221	<p>1. Gain knowledge of evaporation principles, including factors influencing rate and equipment design.</p> <p>2. Understand freezing processes, including freezing time calculation and quality changes during frozen storage.</p> <p>3. Learn about expression and extraction techniques, leaching, crystallization, and dissolution.</p> <p>4. Gain knowledge of distillation, baking, roasting, frying, puffing, pasteurization, sterilization, and other food processing methods.</p> <p>5. Understand freeze drying principles and equipment, and learn about aseptic processing, blanching, homogenization, and emulsification.</p>
	Food Biotechnology	FSQ 222	<p>1. Understand the genetic material and its organization in different organisms.</p> <p>2. Learn about DNA replication, transcription, and translation processes.</p> <p>3. Explore mutation and DNA repair mechanisms, genetic recombination, and gene regulation.</p> <p>4. Gain knowledge of recombinant DNA technology, including cloning and identification of specific genes.</p>

			5. Understand the application of biotechnology in food production, such as enzyme immobilization, and ethical considerations related to genetically modified foods.
	Food Refrigeration and Cold Chain	FPE 222	<ol style="list-style-type: none"> 1. Gain a comprehensive understanding of refrigeration principles and low-temperature production. 2. Learn about various refrigeration cycles, including air refrigerators and vapor compression systems. 3. Study the properties and classification of refrigerants used in vapor compression systems. 4. Explore ice manufacturing, cold storage design, and refrigerated transport for preserving food. 5. Understand the concepts of air conditioning, including comfort air-conditioning, air distribution, and cooling load calculations.
	Processing of Spices and Plantation Crops	FPT 223	<ol style="list-style-type: none"> 1. Understand the production and processing of spice, flavor, and plantation crops. 2. Learn about the post-harvest technology and composition of major and minor spices. 3. Explore the processing and utilization of various spices and flavorings. 4. Gain knowledge of the post-harvest technology and processing of tea, coffee, cocoa, vanilla, annatto, areca nut, cashew nut, and oil palm. 5. Understand the extraction techniques for spice oils and oleoresins, standard specifications of spices, functional packaging, and utilization of by-products.
	Business Management and Economics	FPM 221	<ol style="list-style-type: none"> 1. Understand the principles of management and their application in business. 2. Gain knowledge of the functions of management, including planning, organizing, staffing, directing, and controlling. 3. Learn about different organizational structures and principles of organization. 4. Develop an understanding of basic economic concepts, such as demand and supply, elasticity, markets, national income, production theory, and cost analysis. 5. Explore key aspects of business management, including finance management, accounting systems, human resource management, and corporate social responsibility.
V	Processing Technology of	FPT 311	<ol style="list-style-type: none"> 1. Understand the production and processing scenario of fruits and vegetables globally and in



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	Fruits and Vegetables		<p>India.</p> <ol style="list-style-type: none"> Gain knowledge of the principles and preservation methods used in fruit and vegetable processing. Learn about the supply chain of fresh fruits and vegetables and the primary processing and pack house handling techniques. Explore various processing methods and equipment used for fruits and vegetables, including peeling, slicing, blanching, canning, juicing, preservation, and manufacturing of value-added products. Understand the quality assurance measures, FSSAI specifications, and defects associated with processed fruits and vegetable products, and gain familiarity with commercial processing technology for selected fruits and vegetables.
	Processing of Meat and Poultry Products	FPT 312	<ol style="list-style-type: none"> Understand the meat and poultry industry, including sources, importance, and the status in India. Gain knowledge of pre-slaughter and slaughtering operations, carcass evaluation, and factors affecting meat quality and shelf life. Learn various preservation methods such as chilling, freezing, pickling, curing, cooking, smoking, dehydration, and the use of preservatives. Develop skills in meat cutting, handling, and the preparation of smoked meat, dehydrated meat products, and meat sausages, including quality evaluation. Gain an understanding of abattoir design, egg processing, poultry meat processing, meat plant sanitation, by-product utilization, and safety standards in the meat industry.
	Instrumental Techniques in Food Analysis	FSQ 311	<ol style="list-style-type: none"> Understand the principles and methodologies involved in food analysis, including the detection of adulterations and analysis of proximate constituents, moisture, and minerals. Gain knowledge of analytical techniques such as spectroscopy, chromatography, separation techniques, immunoassay techniques, and evaluation of analytical data. Familiarize with instrumentation and sensors used in the food industry, including near infra-red absorption technology, FTIR measurements, rapid microbiological methods, electronic noses, and

			<p>electronic tongues.</p> <ol style="list-style-type: none"> Learn about the application of novel sensing techniques, sensor arrays, and commercial biosensors in food analysis. Develop skills in conducting food compositional analysis and interpreting analytical results using various instrumental techniques.
	ICT Applications in Food Industry	FBM 311	<ol style="list-style-type: none"> Understand the significance of computerization in the food industry and the operating environments and information systems used in different sectors. Develop skills in using spreadsheet applications for data interpretation, problem-solving, and chart preparation in the context of the food industry. Gain knowledge of web hosting, webpage design, and file transfer protocols relevant to the food industry. Learn the fundamentals of MATLAB, LabVIEW, and CFD software and their applications in the food industry, including data computation, programming, simulations, and process control. Acquire practical skills in utilizing software tools and platforms to enhance efficiency and productivity in food-related processes.
	Food Process Equipment Design	FPE 311	<ol style="list-style-type: none"> Understand the selection of materials and design considerations for food process equipment, including mechanical properties, corrosion prevention, stress analysis, and safety factors. Gain knowledge of the design principles and components of pressure vessels, storage vessels, heat exchangers, evaporators, crystallizers, agitators, separators, freezing equipment, dryers, conveyors, elevators, extruders, and fermenters. Develop skills in designing equipment components such as shells, mountings, heat transfer surfaces, agitators, shafts, pulleys, bearings, belts, and drives. Learn about hazards in process industries and safety measures in equipment design, including the use of protective coatings and pressure relief devices. Acquire an understanding of the economic considerations, temperature effects, and radiation effects in food process equipment design.
	Food Storage Engineering	FPE 312	<ol style="list-style-type: none"> Understand the principles and importance of scientific storage systems for preserving the quality of food products.

			<ol style="list-style-type: none"> 2. Gain knowledge of post-harvest physiology, including the processes of respiration, ripening, and the role of ethylene in fruits. 3. Learn about the causes of spoilage in storage and the control measures to prevent damage from moisture, temperature, humidity, pests, and rodents. 4. Acquire knowledge of different types of storage structures and their design considerations, including farm silos, grain storage structures, and cold stores. 5. Develop an understanding of storage management techniques, including aeration systems for grains, control of storage pests, and the principles and practices of cold storage for perishable products.
	Bakery, Confectionery and Snack Products	FPT 313	<ol style="list-style-type: none"> 1. Understand bakery products, confectionery, and snack products, including their compositions, ingredients, processing, packaging, and storage. 2. Learn about the quality characteristics, defects, and corrective measures for these products. 3. Gain knowledge of snack food seasonings and breakfast cereals, macaroni products, and malts, including their specifications and formulations. 4. Acquire skills in conducting quality testing for bakery, confectionery, and snack products. 5. Develop a comprehensive understanding of the entire process from ingredient selection to final product quality assurance in the bakery, confectionery, and snack industry.
	Marketing Management and International Trade	FBM 312	<ol style="list-style-type: none"> 1. Understanding the fundamental concepts and functions of marketing, and how to effectively manage marketing activities. 2. Developing knowledge and skills in market research, including market measurement, segmentation, targeting, and positioning. 3. Exploring product policy and planning, including product development, branding, packaging, and making strategic pricing decisions. 4. Gaining insights into marketing channels, retailing, and distribution, and understanding their importance in reaching target markets. 5. Acquiring knowledge of international marketing and trade, including export strategies, market entry modes, and the role of government institutions in facilitating international food trade.
VI	Processing	FPT 321	<ol style="list-style-type: none"> 1. Familiarity with the history, significance, and

	Technology of Beverages		<p>current status of the beverage industry.</p> <ol style="list-style-type: none"> 2. Knowledge of processing techniques, equipment, and regulations for different types of beverages. 3. Understanding the use of ingredients, such as sweeteners, colorants, and flavoring agents, in beverage production. 4. Insight into water treatment, quality control, and relevant tests for ensuring beverage quality. 5. Exploration of miscellaneous beverages like coconut water, sweet toddy, and flavored syrups.
	Food Plant Sanitation	FSQ 321	<ol style="list-style-type: none"> 1. Understanding of good manufacturing practices and current regulations in food sanitation. 2. Knowledge of sanitation laws, guidelines, and measures to protect against foodborne bioterrorism. 3. Awareness of personal hygiene, HACCP, and quality assurance practices in sanitation. 4. Familiarity with sanitation practices specific to different food processing sectors, such as dairy, meat, seafood, fruits, and beverages. 5. Ability to implement effective sanitation procedures, including cleaning, sanitizing, waste disposal, and pest control.
	Food Packaging Technology and Equipment	FPT 322	<ol style="list-style-type: none"> 1. Understand the significance of food packaging and its requirements in the global and Indian context. 2. Gain knowledge of different packaging materials, including paper, glass, metal, and plastic, and their advantages and disadvantages. 3. Learn about packaging techniques such as lamination, moulding, coating, and aseptic packaging, and their respective advantages and processes. 4. Comprehend the permeability of gases and vapours in packaging materials and its relationship to the packaging needs of food products. 5. Develop skills in evaluating the mechanical and functional aspects of food packaging through tests and simulations, and apply this knowledge to specific food products.
	Processing of Fish and Marine Products	FPT 323	<ol style="list-style-type: none"> 1. Understand fisheries resources, types of fish, and marine products. 2. Comprehend fish composition, spoilage mechanisms, and storage factors. 3. Gain knowledge of processing techniques and their impact on fish quality and storage. 4. Learn preparation protocols for indigenous fish

			<p>products and explore novel processing methods and packaging techniques.</p> <p>5. Develop an understanding of seafood quality assurance, including HACCP, regulations, and emerging issues in seafood processing.</p>
	Sensory Evaluation of Food Products	FPT 324	<ol style="list-style-type: none"> 1. Understand the significance of sensory evaluation in relation to consumer acceptability and its impact on the food industry. 2. Familiarize with the terminology, principles, and factors influencing sensory perception in food products. 3. Develop skills in conducting discrimination tests and understanding their procedures, including difference tests, ranking, scoring, hedonic scales, and descriptive tests. 4. Gain knowledge of panel selection, training of judges, and sampling procedures for sensory evaluation. 5. Apply sensory testing techniques in food product development and quality control, and understand the relationship between sensory properties and instrumental/physico-chemical tests.
	Food Additives and Preservatives	FSQ 322	<ol style="list-style-type: none"> 1. Understanding the safety evaluation and toxicology of intentional and unintentional food additives. 2. Familiarity with natural and artificial food colorants and their processing methods. 3. Knowledge of food preservatives and their chemical actions, including their roles in food preservation. 4. Awareness of various other food additives, such as stabilizers, thickeners, antioxidants, sweeteners, enzymes, and flavor enhancers, and their functions in food processing. 5. Understanding the regulatory aspects and guidelines related to food additives and preservatives.
	Food Quality, Safety Standards and Certification	FSQ 323	<ol style="list-style-type: none"> 1. Understanding food quality attributes and their classification in the food industry. 2. Measurement techniques for assessing color, gloss, viscosity, taste, odor, and sensory perception. 3. Factors influencing sensory measurements and the correlation between sensory and instrumental analysis. 4. Quality considerations throughout the food

			<p>production process, including raw materials, processing, packaging, and storage.</p> <p>5. Knowledge of quality management systems, such as Total Quality Management (TQM) and Hazard Analysis and Critical Control Points (HACCP), as well as certification procedures and auditing.</p>
	Instrumentation and Process Control in Food Industry	FPE 321	<p>1. Understanding the principles and characteristics of instrumentation used in the food industry, including temperature, pressure, level, flow, and weight measurements.</p> <p>2. Familiarity with a variety of instruments and their applications in food processing.</p> <p>3. Proficiency in measuring and controlling important parameters such as moisture content, viscosity, color, density, pH, and brix in food products.</p> <p>4. Knowledge of control systems, including pneumatic and electrical systems, and their role in maintaining process parameters.</p> <p>5. Ability to analyze and optimize process control systems, including frequency response analysis, stability analysis, and the use of transducers, controllers, and computer-based monitoring systems.</p>
	Project Preparation and Management	FBM 321	<p>1. Apply project selection techniques to identify and screen potential projects, and develop project charters and proposals.</p> <p>2. Utilize project planning and scheduling tools, such as work breakdown structure and critical path method, to effectively plan and schedule project activities.</p> <p>3. Estimate project costs using appropriate methods and consider resource allocation and leveling.</p> <p>4. Implement, monitor, and control projects, including team building, leadership, and addressing organizational and behavioral issues.</p> <p>5. Evaluate project completion and review processes, and understand emerging trends in project management, including the use of computer-based tools.</p>
VII	Communication Skills and Personality Development	FBM 411	<p>1. Demonstrate effective communication skills, both verbal and non-verbal, including listening, note-taking, writing, and oral presentation skills.</p> <p>2. Develop self-awareness and personal growth through the understanding of etiquette, manners, and the ability to overcome fear and anxiety.</p>

			<ol style="list-style-type: none"> 3. Apply priority and time management techniques to effectively manage tasks and responsibilities. 4. Cultivate a positive attitude, self-confidence, and motivation, while improving their personality traits. 5. Acquire important career planning skills, such as resume building, interviewing techniques, and participating in group discussions.
Entrepreneurship Development	FBM 412		<ol style="list-style-type: none"> 1. Understand and appreciate the significance of entrepreneurship and the qualities of successful entrepreneurs. 2. Analyze the business environment in India and globally, and its influence on entrepreneurial decision-making. 3. Acquire knowledge of key concepts such as idea generation, SWOT analysis, and project feasibility. 4. Recognize the role of women entrepreneurs, corporate entrepreneurship, and factors influencing project growth. 5. Familiarize with government schemes, incentives, and policies supporting entrepreneurship, and understand social responsibility in the food processing sector.
Student READY-Experiential Learning Programme	FPO 411		<ol style="list-style-type: none"> 1. Gain practical skills and hands-on experience through experiential learning in pilot plants for processing various commodities. 2. Create a Detailed Project Report for establishing a product manufacturing enterprise. 3. Evaluate the module to identify areas for improvement in the experiential learning process. 4. Develop entrepreneurship attributes and enhance employability for better work readiness and self-employment opportunities. 5. Acquire industry-relevant knowledge and skills, improving readiness for the job market and entrepreneurship.
Student READY-Research Project	FPO 412		<ol style="list-style-type: none"> 1. Conduct independent investigation on selected problems in Food Processing Technology, showcasing research skills and self-motivation. 2. Gather and analyze data through library work, field research, and laboratory experiments. 3. Develop effective report-writing skills to communicate the findings, conclusions, and recommendations of the project. 4. Enhance critical thinking, problem-solving, and

			<p>communication abilities through the project work.</p> <p>5. Deepen understanding of Food Processing Technology and its practical applications, while fostering research-oriented mindset.</p>
	Student READY-Seminar	FPO 413	<p>1. Enhance research and presentation skills through seminar preparation and delivery on current topics in Food Processing technology.</p> <p>2. Create a well-structured synopsis, highlighting key points and findings for the seminar presentation.</p> <p>3. Deliver engaging presentations, effectively communicating information on the chosen topic.</p> <p>4. Actively participate in discussions, showcasing critical thinking and the ability to express and defend opinions.</p> <p>5. Increase knowledge and awareness of current trends in Food Processing technology through seminar presentations and discussions.</p>
VIII	Student READY-Industrial Tour	FPO 421	<p>1. Gain practical exposure and firsthand experience through an educational tour of various industries.</p> <p>2. Expand knowledge of real-world applications in Food Processing technology by observing industry operations and processes.</p> <p>3. Develop skills in critically analyzing and evaluating industrial practices.</p> <p>4. Demonstrate effective communication and report-writing skills through the preparation of a comprehensive report on the industrial tour.</p> <p>5. Enhance awareness of the industrial landscape and its relevance to the field of Food Processing technology.</p>
	Student READY-Internship/In-Plant Training	FPO 422	<p>1. Gain practical experience through a one-semester in-plant training at a relevant food processing industry or related establishment.</p> <p>2. Develop hands-on skills and knowledge applicable to commercial operations.</p> <p>3. Understand workplace dynamics and cultivate professional conduct and work ethics.</p> <p>4. Apply theoretical knowledge to real-world scenarios, bridging the gap between theory and practice.</p> <p>5. Enhance employability through practical skills, industry insights, and professional networks gained during the in-plant training.</p>

POs and COs Post Graduate degree program

POs: M.Tech. Agricultural Engineering -Process and Food Engineering

- Student will learn all basic topics and by taking into consideration demands of corporate sector harnessing commercial aspects, modern research tools and their applications, supplementary skills required and enhancing the global competitiveness and employability of students.
- Trained students will easily deal with the post harvest processing of cereals, pulses, oil seeds, fruits and vegetable processing industry
- The students will get knowledge on various unit operations, backbone of all food processes. Knowledge on basic principles of thermal food processes, size reduction and separation operations involved in food processing and related equipment will prepare students to solve problems related with food processing.

COs M.Tech. Agricultural Engineering -Process and Food Engineering

S. No.	Courses	Course code	Outcome
1.	Processing of Cereals, Pulses and oilseeds	PFE-506	Student's capability to mill and process (value added products) all kinds of field crops as per requirement of food industries.
2.	Fruits and Vegetables Process Engineering	PFE-508	Student's capability to mill and process (value added products) all kinds of horticultural crops as per requirement of food industries.
3.	Farm Structures and Environmental Control	PFE-512	Student's capability to design new farm structures and create suitable atmosphere within it.
4.	Transport Phenomena in Food Processing	PFE 501	The course will impart requisite knowledge about transport phenomenon with respect to heat, mass and momentum transfer which is necessary to understand the food processing operations.
5.	Advanced Food Process Engineering	PFE-503	Student's capability to develop food products using recent techniques as per requirement of food industries.
6.	Engineering Properties of Food Materials	PFE-502	Student's capability to apply properties of food for design of equipment and structures.
7.	Unit Operations in Food Process Engineering	PFE-504	The students will get knowledge on various unit operations. Knowledge on basic principles of thermal food processes, size reduction and separation operations involved in food processing and related equipment will prepare students to solve problems related with food processing. This will help students to solve problems of post-production processes and will also enhance employability in food industries.



POs of Doctoral degree program

POs Ph.D. Agricultural Engineering (Process and Food Engineering)

- Student's capability to understand and undertake mechanical handling of food as per requirement of food industries as well as storage devices and systems for safe storage of food for longer period of time.
- Student's capability to develop dehydrated food products with higher retention of nutrients using different drying techniques and equipment.
- Student's capability to process and preserve food products using advance techniques as per requirement of food industries.

COs Ph.D. Agricultural Engineering (Process and Food Engineering)

S. No.	Courses	Course code	Outcomes
1.	Storage Engineering and Handling of Agricultural Products	PFE 513	Student's capability to understand and undertake mechanical handling of food as per requirement of food industries as well as storage devices and systems for safe storage of food for longer period of time.
2.	Agricultural Waste and Byproduct Utilization	PFE 605	Student's capability to develop processes for effective utilization of wastes generated through milling and processing of food materials.
3.	Advances in Drying of Food Materials	PFE 604	Student's capability to develop dehydrated food products with higher retention of nutrients using different drying techniques and equipment.
4.	Textural and Rheological characteristics of Food Materials	PFE 601	Student's capability to determine textural and rheological properties of food materials and their application in control of food processing operations.
6.	Advances in Food Processing	PFE 602	Student's capability to process and preserve food products using advance techniques as per requirement of food industries.



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