M. Tech in Food Technology (**Food Laws & Policies**)

Basic Supporting Courses:

	Course Code	Course Title	L	T	P	Credit
1.	COMP 805	Computer Programming	2	0	1	3
2.	MAS 713	Advanced Engg. Statistics	3	0	0	3
3.	APFE 705	Optimization Techniques in Food Technology	3	0	0	3
4.	CHEM 717	Advanced Food Chemistry	2	0	1	3

Core Courses:

	Course Code	Course Title	L	T	P	Credit
1.	APFE 706	International Food Legislations & Standards	2	0	0	2
2.	APFE 707	Food Quality Control	2	0	1	3
3.	APFE 708	Meat & Marine Technology	2	0	1	3
4.	APFE 802	Modern Fruits & Vegetables Processing Techniques	2	0	1	3
5.	APFE 803	Advanced Food Packaging	2	0	0	2
6.	APFE 811	Advanced Beverage Technology	3	0	0	3
7.	APFE 823	Modern Baking & Confectionary Technology	2	0	1	3
8.	DT 820	Processing of Milk & Milk Products	2	0	1	3
9.	MBMT811	Food Microbiology	2	0	2	4

Specialized Courses:

Food Laws & Policies:

Course Code	Course Title	L	T	P	Credit
APFE 840	Global Food Marketing Development & Aid Policy	2	0	0	2
APFE 845	Hazard Analysis Critical Control Point Planning and Implementation	3	0	0	3
APFE 846	Food Safety Assessment	2	0	1	3
APFE 847	Food Standards & Quality Control	3	0	0	3
APFE 848	Food Policies & Regulations	2	0	0	2
APFE 849	Food Certification	2	0	0	2
APFE 850	Industrial & Competition Policies in Food Sector	3	0	0	3

Basic Supporting Courses:

COMP 805 Computer Programming 3(2-0-1)

Algorithms & Flow Charts, C. Programming, Preliminaries, Constant & Variables, Arithmetic Expressions Input-Output Statements, Control Statements, Do-Statements, Subscripted Variables, Elementary Format Specifications, Logical Statement & Decision Tables, Functions & Subroutines, Arrays & structure, Computer Oriented Numerical Methods, Solution of Non Linear Equation. Bisection Method, Newton Method, Numerical Integration, Trapezoidal Method, Simpson's 1/3 & 3/8 rule, Curve Fitting, Construction of forward, backward, backward difference table, Interpolation, Application of Statistical packages.

MAS 713 Advanced Engineering Statistics 3(3-0-0)

Sample size, data collection, design of experiments, LSD, RBD, split plot design, factorial design, CRD, CCRD, testing of hypothesis, Analysis of variance, t-test, z-test, f-test, X^2-test.

APFE 705 Optimization Techniques in Food Technology 3 (3-0-0)

Principles of modelling; Linear programming-concepts, graphical and algebraic solution; Simplex method; Duality theory; Post-optimality analysis; Sensitivity analysis; Transportation and assignment models; Computer applications to LP, queuing theory; Project scheduling and management by PERT-CPM; Integer programming; Non-linear programming; Simulation; Goal programming; Decision theory; Markov chains; Sequencing problem.

CHEM 717 Advanced Food Chemistry 3(2-0-1)

Water:- Water binding and chemical mediated water.Food protein: Classification, physico-chemical properties. Reactions involved in processing. Reactions with alkali. Enzyme catalyzed reactions involving hydrolysis and proteolysis. . theories of formation of texturiesed proteins.

Lipids :- Reactions involved during deep frying of foods viz., autoxidantion of saturated acyl lipids and polymerization. Lipopotein and membrane; definition, classification and involvement in the formation of biological membrane. Unsaponsifiable matter contents in various fats and oils. Edible oil classification and chemical composition.

Carbohydrates:- Legumes jam and jellies polysaccharide. Viz., liner, branched and modified. Properties and utilization of common polysaccharides, viz. Cellulose, glycogen, hemicellulose and pectin. Enzymatic degradation of polysaccharides, viz. agar, alginate, carrageenam, gums and starch. Production of dextrans and malto dextran.

Food Enzymes:- Hydrolases and lipases, utilization in food industry, effect of inhibitors, pH and temperature.

Minerals in food :- Main elements, trace elements in eggs, cereal and cereal products vegetables and fruits.

Aroma compounds in foods:- Threshold value, off flavours.

Food additives:- Vitamins, amino acids, minerals, Aroma substance flavour enhancers-monsodium glutamate, 5-nucleotides. Sugar substitutes, sorbital. Sweeteners-saccharin, cyclamate. Food colour. Anti-nutritional factors and food contaminant: Toxic-trace elements, radio nuclides.

Cereals and cereal products:- Individual constituents, like proteins, lipids carbohydrates and vitamins in cereals flour and their relationship in dough making. Types of flours, bread making

and non-bread making chemical composition influence of additives/minor ingredients on baking properties.
Legumes:-Classification composition and physio-chemical properties.

Vegetables and fruit: Classification general composition, chemical changes during ripening and storage. Jams, jellies and pickles: Classification, composition and preservation.
Beverages: Classification, coffee, tea and cocoa-gradation, composition, chemical changes during processing, volatile compounds. Preservation of foods: General principles of food preservation, chemical preservation, preservation through irradiation.

Core Courses

APFE 706 International food Legislation & Standards 2 (2-0-0)
Concepts and trends in food legislation. International and federal standards: Codex alimentarious, ISO series, food safety in USA. Legislation in Europe: Directives of the official journal of the EU, council regulations, food legislation in UK. Regulating methods for food analysis, case studies. Enforcers of Food Laws Approval Process for Food Additives Nutritional Labeling.

APFE 707 Food Quality Control 3(2-0-1)
Quality factos: appearance, texture and flavor, Apperance factors – size and shape, colour ad gloss, consistency. Textural Factors – measuring texture, texture changes. Flavour Factors – influence of colour and texture on flavor. Taste Panels. Food – related azards – biological hazards, chemical hazards, physical hazards, trace chemicals. Microbiological considerations in food safety. Food additives – preservatives, atioxidats, sequestrants, surface active agents, stabilizers and thickeners, bleaching and maturing agents, starch modifies, buffers, acids, alkalis, food colours, artificial sweteners, nutritional additives, flavouring agents. Food laws: Federal Food Drug and Cosmetic Act (1938), Good Manufacturing Practices (Code of GMP), Fair Packaging and Labeling Act (1966), Federal Meat Inspection Act (1906), International Food, Standards and Codex Alimentarius, HACCP and ISO 9000 series.

APFE 708 Meat & Marine Technology 3(2-0-1)
Sources of meat and meat products in India, its importance in national economy. Chemical composition and microscopic structure of meat. Effect of feed, breed and management on meat production and quality. Slaughtering of animals and poultry, inspection and grading of meat. Factors affecting post-mortem changes, properties and shelf-life of meat. Meat quality evaluation. Mechanical deboning, meat tenderization. Aging, pickling and smoking of meat. Meat plant sanitation and safety, Byproduct
utilization. Recent trends in meat processing. Structure, composition, nutritive value and functional properties of eggs and its preservation by different methods. Factor affecting egg quality and measures of egg quality. Types offish, composition, structure, post-mortem changes in fish. Handling of fresh water fish. Canning, smoking, freezing and dehydration of fish. Fish sausage and home making. MMPO, MFPO, radiation processing meat safety.
Practical: Slaughtering and dressing of meat animals, Study of post-mortem changes, Meat cutting and handling, Evaluation of meat quality. Experiments in dehydration, freezing, canning, curing, smoking and pickling offish and meat, Shelf-life studies on processed meat products, Evaluation of quality and grading of eggs, Preservation of shell eggs, Estimation of meat: bone ratios, Preparation of meat products, canned, dehydrated, barbecued sausages, loaves, burger, fish finger.

APFE 802 Modern Fruits and Vegetables Processing Techniques 3(2-0-1)

Principles and methods of fruit and vegetable preservation. Composition and related quality factors for processing. Principles of storage of fruits and vegetables. Types of storate: natural, ventilated low temperature storate, DA and MA storages. Preservation of fruits and vegetables by heat, chemicals, sugar, salt, fermentation, drying etc. Canning of fruits and vegetables, tin cans, glass containers seaming technology, aseptic canning technology. Fruit and vegetable juices, preparation of syrups, cordials and nectars, juice concentrates, pectin and related compounds, jams, jellies, marmalades, preserves. Theory of gel formation, quality control, pickles, chutneys and vinegar production, tomato products. Drying and dehydration of fruits and vegetables, problems related to storage of dehydrated products. Freezing and freeze-drying of food and frozen products, Fruit product order and quality control.

Practicals: Equipment for fruits and vegetable processing, plant-layout, can seaming operation, preparation of fruit juices, squashes, syrups and ready-to-serve beverages. Canning of fruits and vegetables. Preparation of jams, jellies, marmalade, preserves, and candies. Preparation of pickles, chutneys, and tomato products, Drying of fruits and vegetables, quality control of processed products. Visit to fruit and vegetables processing factories, freezing of foods, Processing of mushroom.

APFE 803 Advanced Food Packaging 2(2-0-0)

Introduction to principals of Food Packaging, Types of packaging , Special packaging methods (vacuum, gas and shrink packaging), Function of a package, packaging materials, their structural qualities and performance including moisture and gas transmission, interaction of food and the packaging material, methods of package testing, performance evaluation and design of packaging systems for plant and animals products. Food packaging and law, shelf life testing, modern and traditional packaging material, physical and chemical properties, production, storage and recycling of packaging materials, regulation and equipment analysis of various existing packaging system and standards.

APFE 811 Advanced Beverage Technology 3(3-0-0)

Introduction: classification, production and consumption f beverages. Alcoholic beverages: concept of fermentation for production of beer, wine and distilled beverages including their packaging and maturation. Non-alcoholic beverages: carbonated and non-carbonated. Raw materials, equipment, quality control and legislation of beverage products. Mini-projects on traditional production of beverages.

APFE 823 Modern Baking & Confectionary Technology 3(2-0-1)

Introduction: Status of bakery and confectionery industries in India- Raw materials for bakery and confectionery products-Essential and optional. PFA Specification of raw materials. Bakery products technology: Dough rheology – Bread making- methods-process- specification for various types of breads- Biscuit manufacturing process-Cookies- Crackers- Cakes- Buns- preservation of bakery products. Bakery machinery and equipment: Weighing Equipment- Manual scale, Automatic weigh, liquid measuring.

Mixing- blenders, Horizontal and vertical planetary, continuous. Make up equipment- Divider, Rounder, Proofer, moulder. Baking equipment – different oven, slicer.

Confectionery products: chocolate, fondant, caramels, fudge and toffee. Equipment and process. Safety and sanitation: Health and safety- safety rules- safe practices in the work places- sanitation- duties of the sanitation equipments- Code for hygiene condition in bakery and biscuit manufacturing unit.

DT 820 Processing of Milk and Milk Products 3(2-0-1)

Sources, and composition of milk, processing of market milk, standardization, toning of milk, homogenization, pasteurization, sterilization, storage, transportation and distribution of milk. Milk product processing-cream, butter, , condensed milk, evaporated milk, whole and skimmed milk powder. Instantization of milk and milk products, ice cream, khoa, channa, paneer, milk sweets. Judging and grading of milk and its products. Fermented milk products. cheese, cheese spread, Youghurt, dahi shrikhand and similar products. Dairy equipments and sanitization.

MBMT 811 Food Microbiology 4(2-0-2)

History of microbiology of food. Microbial growth pattern, physical and chemical factors influencing destruction of micro-organisms. Types of micro-organism normally associated with food-mold, yeast, and bacteria. Micro-organisms in natural food products and their control. Contaminants of foods-stuffs, vegetables, cereals, pulses, oilseeds, milk and meat during handling and processing. Biochemical changes caused by micro-organisms, deterioration of various types of food product. Food poisoning and microbial toxins, microbial food fermentation, standards for different foods. Food borne intoxicants and mycotoxins.

Practicals : Microscopy and micrometry. Preparation of nutrient media, sterilization and inoculation techniques, Isolation of pure culture, microbial examination of natural food products, identification of food pathogen in water, milk, cereals, pulses, oilseeds, meat and poultry. Microbial production of alcohol (cereal based), acetic acid and lactic acid.

Specialized Courses

APFE 840 Global Food Marketing Development & Aid Policy 2(2-0-0)

Marketing in the global world, strategic planning and the marketing process, the marketing environment, marketing research and information systems, consumer markets and consumer buyer behavior, market segmentation, targeting and positioning for competitive advantage, Product and services strategy, Pricing products, Distribution channels and logistics management, Retailing and wholesaling, Direct and online marketing, competitive strategies, Global Marketplace, Marketing and society, Subsidies, Aid Policies of different international agencies and their impact on availability & Marketing

APFE 845 Hazard Analysis Critical Control Point planning and Implementation 3 (3-0-0)

INTRODUCTION ,FAO/WHO guidance document Objectives Scope Target audience The HACCP system The food safety burden Codex guidelines on HACCP Role of government and potential benefits Role of food businesses and potential benefits Exploring approaches for HACCP in SLDBs Interdependency between HACCP systems and good hygienic practices, Basic hygiene Staff-related challenges Awareness and expertise Education and training Technical support Human resources Psychological factors Challenges due to inadequate supporting environment Financial issues Government infrastructure and commitment Legal requirements Business awareness and attitude of industry and trade associations Customer awareness Communication development of a haccp strategy for sldbs within a national food safety policy Development of strategy for HACCP implementation Gather information Define barriers and identify causes Develop and select possible solutions Conduct assessment of potential impact of strategy Modify and publish strategy Implement strategy Review and revise Criteria for measuring success of strategy HACCP implementation Indicators of successful HACCP implementation strategic activities to facilitate haccp implementation in sldbs Support activities Provision of financial support Provision of guidance and explanatory information Mandatory provisions and enforcement HACCP certification Provision of technical expertise by consultants and other advisors HACCP-based approaches Codes and standards documents Generic HACCP-based plans Evolving HACCP-based methodologies .

APFE 846 Food Safety Assessment 3(2-0-1)

The importance of food safety, Food safety management procedures,The principal causes of food borne illness,The principal symptoms of food borne illness,How food borne illness affects consumers and retailers,,How poor safety practices affect food products,Food safety procedures in retail stores, Preventing food borne illness, Food hazards, The four c's, Record keeping, Due diligence, Reporting procedures, Legal responsibilities, The food business, the responsibilites of the managers, Penalties applicable to poor food handlers, Enforcement officers, Enforcement powers, The importance of personal hygiene, The principal food safety hazards on the human body, Basic rules regarding personal hygiene, Appropriate protective clothing, When to change protective clothing, Effective personal hygiene practices Good Manufacturing Practice. Metal contaminants- Sources of health hazard of metallic contaminants – Assessment of food safety – General and acute toxicity – Mutagenicity and carcinogenicity. Additives (Intention – direct) – Preservatives – antioxidants, sweeteners, flavors, colours, vitamins, stabilizers – indirect additives – organic resides – inorganic residues and contaminants. Food allergy, food intolerance, contaminants of processed foods, solvent residue, contaminants of smoked foods. Cleaner production is food industry-fruit and vegetable processing, sea food processing, brewing and wine processing..

APFE 847 Food Standards & Quality Control 3(3-0-0)

Quality terms & definitions ,Terms relating to quality, management and organization Terms relating to process and product, characteristics and conformity Terms relating to documentation, examination and audit Quality development cycle, elements and their evaluation Developing of quality and quality cycle Quality attributes and their evaluation: - Sensory quality attributes: appearance, color, texture, flavour - Non-sensory quality attributes: quantitative, hidden and nutritive quality attributes Food quality management: structures, policies and Responsibilities: Quality benefits Quality control department and its responsibilities Quality control department interrelations with research and product development, production, and marketing departments Food standardization and legislation Food law: aims, importance, regulations and contents and terms relating to adulteration and misbranding status of the food legislation in the Arab states and the National food control in light of the current food law Standardizations: fundamentals, areas, benefits ad aims National, regional and international institutions relating to food standardization Standard food specifications: importance of specifications, preparation and amendment of specification Statistical tools and quality improvement Control charts: importance of charting and procedures for constructing variable(X and R) as well as attribute (p, np, c and u) charts Sampling: importance, objectives and methods of determining sampling size and how to use the statistical tables Types of inspection, classes of defects, and acceptable quality level (AQL) Food quality systems: GMP, ISO 9000,HACCP, risk analysis and conformity certificate Food good manufacturing practice(GMP):introduction, quality management, personnel and training and documentation, manufacturing, heat preserved foods, chilled and frozen food, good control laboratory practice, infestation control … etc. ISO 9000: family of Iinternational Standards, the 1994 and 2000 vergins , the differences and reasons behind modification ISO 9001: 2000, quality management system- requirements: quality management system, management responsibility, resource management, product realization and measurement, analysis and improvement Hazard analysis and critical control point(HACCP): definitions and advantages, the seven principles, steps involved in application.

APFE 848 Food Policies and Regulation 2(2-0-0)

International Food Policies and Regulation and Codex Alimentarius : Principles and standards of international food regulations; roles of various international agencies : WHO, FAO, Codex, and WTO; the WTO agreements in relation to SPS (Sanitary Phytosanitary Measures) and TBT (Technical Barrier to Trade), role and function of FEHD; health inspectors; Centre for Food Safety; regulations on harmful substances in food, imported meat and poultry, milk/dried milk, labeling, food business, frozen confections, coloring matters, preservatives, sweeteners and other additives; guidelines on voluntary labeling of genetically modified (GM) food, imported foods and food recall; microbiological guidelines for ready-to-eat food; code of hygienic practice for aseptically processed and packaged low-acid foods.

Food Laws and Regulations in the United States of America: Basic food laws and regulations in the United States; the roles of Food and Drug Administration (FDA), the United States Department of Agriculture (USDA), Environmental Protection Agency and the Federal Trade Commission; major food legislation in the United States: Food, Drug and Cosmetic Act, Dietary Supplement Health and Education Act, and other requirement related to GM labeling, nutrition labeling and health claims.

Food Laws and Regulations in the European Union : The principles of food laws and regulations in the European Union; farm-to fork approach in food safety; the role of European Food Safety Authority; regulations on chemicals in food, food hygiene, general and nutrition labeling, GM labeling, nutrition claims, health claims, etc

APFE 849 Food Certification 2(2-0-0)

Concepts about certification, concepts related to food safety management, economic background, development of private food safety standards in response to consumer expectations, development of third party certification, increasing power of retailers in industrialized countries, international reference for food safety standards: the codex alimentarius, the codex alimentarius, normative texts of the codex alimentarius on food safety, certification programmes for good practices, certification programmes for quality management and HACCP systems, certification programmes for complete food safety management systems, benchmarking by the global food safety initiative (gfsi), the global food safety initiative, benchmarked standards, global standard – food, international food standard (ifs), impact on producers, impact on global trade, impact on food safety governance.

APFE 850 Industrial & Competition Policies in Food Sector 3(3-0-0)

Brand-Based Competition in the Agri-Food Sector, Food Processing and Distribution: An Industrial Organization Approach, Market structure of the food industry, Theory of oligopoly and oligopsony, Structure of the food industry, Food industry and competition policy, Quality of products in the food sector, Theory of product differentiation, Consumer demand for differentiated products, Public and private policy for product quality, Vertical co-ordination in the food sector, Theory of vertical co-ordination, The organisation of the agro-food chain: from agribusiness to final consumers. The increasing role of the retail sector.