DEPARTMENT OF M.SC. FOOD SCIENCE TECHNOLOGY

1	M.SC	FOOD CHEMITSTRY AND NUTRITION
2	M.SC	FOOD MICROBIOLOGY
3	M.SC	FERMENTED FOODS AND BEVERAGES
4	M.SC	PRINCIPALES OF FOOD ENGINEERING
5	M.SC	TECHNOLOPGY OF MILK AND MILK PRODUCTS
6	M.SC	FRUIT AND VEGETABLE PROCESSING & PRESERVATION TECHNIQUES

Dr A. Sheshachalam
PRINCIPAL
Principal
Vaagdevi Degree & P.G. College
Kishanpura, Hanamkonda

Approved syllabus

For

M.Sc Food Science & Technology course

(2022-23 under CBCS)

Department of

Food Science & Technology (**ZOOLOGY)**

KAKATIYA UNIVERSITY
WARANGAL 506 009 TELANGANA
STATE

M.Sc Food Science &Technology - 2022-23

Under Choice Based Credit System

SU - M.Sc (FST) I SEMESTER

Paper Code	Title	Workload Per Week hrs		Marks			Credits	Duration of the Exam.
		Theory	Practical	Internal	University	Total		
CPT FST 111	FOOD CHEMISTRY AND NUTRITION	4	--	20	80	100	4	3 Hrs
CPT FST 112	FOOD MICROBIOLOGY	4	--	20	80	100	4	3 Hrs
CPT FST 113	TECHNOLOGY OF CEREALS,LEGUMES AND OIL SEEDS	4	--	20	80	100	4	3 Hrs
CPT FST 114	FERMENTED FOODS AND BEVERAGES TECHNOLOGY	4	--	20	80	100	4	3 Hrs
CPP FST 115	FOOD CHEMISTRY AND NUTRITION LAB	--	6	15	60	75	3	4 Hrs
CPP FST 116	FOOD MICROBIOLOGY LAB	--	6	15	60	75	3	4 Hrs
CPP FST 117	FERMENTED FOODS AND BEVERAGES TECHNOLOGY LAB	--	6	15	60	75	3	4 Hrs
TOTAL		16	18	125	500	625	25	

M.Sc (FST) II SEMESTER

Paper Code	Title	Workload Per Week hrs		Marks			Credits	Duration of the Exam.
		Theory	Practical	Internal	University	Total		
CPT FST 121	PRINCIPLES OF FOOD ENGINEERING	4	--	20	80	100	4	3 Hrs
CPT FST 122	TECHNOLOGY OF MILK AND MILK PRODUCTS	4	--	20	80	100	4	3 Hrs
CPT FST 123	FRUIT AND VEGETABLE PROCESSING&PRESERVATION TECHNIQUES	4	--	20	80	100	4	3 Hrs
CPT FST 124	TECHNOLOGY OF MEAT, FISH, POULTRY &THEIR PRODUCTS	4	--	20	80	100	4	3 Hrs
CPP FST 125	PRINCIPLES OF FOOD ENGINEERING LAB	--	6	15	60	75	3	4 Hrs
CPP FST 126	TECHNOLOPGY OF MILK AND MILK PRODUCTS LAB	--	6	15	60	75	3	4 Hrs
CPP FST 127	FRUIT AND VEGETABLE PROCESSING&PRESERVATION TECHNIQUES LAB	--	6	15	60	75	3	4 Hrs
TOTAL		16	18	125	500	625	25	

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SU - M.Sc (FST) III SEMESTER

Paper Code	Title	Workload Per Week hrs		Marks			Credits	Duration ofthe Exam.
		Theory	Practical	Internal	University	Total		
CPT FST 211	FOOD SAFETY, QUALITY CONTROL AND MANAGEMENT SYSTEMS	4	--	20	80	100	4	3 Hrs
CPT FST 212	APPLIED STATISTICS	4	--	20	80	100	4	3 Hrs
CPT FST 213	ELECTIVE - I A) TECHNOLOGY OF SUGAR CONFECTIONERY & CHOCOLATE PROCESSING	4	--	20	80	100	4	3 Hrs
	B) TECHNOLOGY OF SPICES, CONDIMENTS & PLANTATION CROPS	4	--	20	80	100	4	3 Hrs
CPT FST 214	ELECTIVE – II A) BAKING SCIENCE AND TECHNOLOGY	4	--	20	80	100	4	3 Hrs
	B) EXTRUSION TECHNOLOGY	4	--	20	80	100	4	3 Hrs
CPP FST 215	FOOD PROCESSING LAB-I	--	9	20	80	100	4	4 Hrs
CPP FST 216	FOOD PROCESSING LAB-II	--	9	20	80	100	4	4 Hrs
FST 217	SEMINAR	2		25		25	1	
TOTAL		18	18	145	480	625	25	

SU M.Sc (FST) IV SEMESTER

Paper Code	Title	Workload Per Week hrs		Marks			Credits	Duration of the Exam.
		Theory	Practical	Internal	University	Total		
CPT FST 221	ADVANCES IN FOOD PACKAGING	4	--	20	80	100	4	3 Hrs
CPT FST222	FOOD PRODUCT DEVELOPMENT AND ENTREPRENEURSHIP	4	--	20	80	100	4	3 Hrs
CPP FST 223	FOOD PRODUCT DEVELOPMENT LAB		8	20	80	100	4	4 Hrs
FST 224	MAJOR PROJECT		18	100	200	300	12	
FST 225	SEMINAR	2			25	25	1	
TOTAL		10	26	160	465	625	25	

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I SEMESTER

PAPER I
FOOD CHEMISTRY AND NUTRITION

Credits : 4 **Semester: I**
Course Code : FST111 **No. of Lecture hours: 4 hrs /week**

Course Objectives:

- To provide an optimum environment for students to gain an understanding of the chemical bases of food component reactivity and functionality.
- To provide an opportunity for students to test various approaches for manipulating the chemical and/or functional properties of foods.

Major food constituents I:

Unit-1

- Food chemistry-definition and importance.

Carbohydrates

- Definition and importance, classification, sources, functions, physico-chemical properties, functional properties of sugars and polysaccharides in foods. Dietary fibre and food applications. Effect of processing on nutritional quality of carbohydrates.

Water:

- Water in foods, Types of water in foods: Water activity-Definition, measurement of water activity, role and importance of water activity in foods

Major food constituents II:

Unit-2

Proteins and amino acids

- Definition and importance, classification, sources, functions, physico-chemical properties and functional properties of proteins. Browning reactions in foods. Protein concentrates, isolates and hydrolysates and their applications-

Lipids:

- Definition and importance, classification, sources, functions, physical and chemical properties, functional properties, , rancidity and reversion, types of rancidity, factors leading to rancidity and reversion, changes in lipids during storage and processing.

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Unit-3

Minor food constituents:

- Minerals, vitamins, pigments, flavours and anti-nutritional compounds. Changes in vitamins and minerals during storage and processing.

Enzymes:

- Definition, importance, classification and properties;
- Enzymatic browning in foods and industrial applications of enzymes.

Unit-4

Food Additives

- Food Additives: Definition, importance, classification and properties;
- Toxicology - evaluation techniques and uses.

Food & Nutrition

- Food groups: Typical composition
- Essential nutrients:
- sources, deficiency diseases; requirements and recommended dietary allowances
- Digestion, absorption, transport and metabolism of nutrients in human system

COURSE OUTCOME:

Student will be able to understand the basic components of food and their importance.

Suggested Readings:

1. Fennema OR.1996. *Food Chemistry*. Marcel Dekker.
2. Meyer LH. 1987. *Food Chemistry*. CBS.
3. Belitz HD.1999. *Food Chemistry*. Springer Verlag.
4. DeMan JM. 1976. *Principles of Food Chemistry*. AVI.
5. Bamji MS, Rao NA & Reddy V. 2003. *Textbook of Human Nutrition*.Oxford & IBH.
6. Swaminathan M. 1974. *Essentials of Foods and Nutrition*. Vol. II. Ganesh & Co.

PAPER-II
FOOD MICROBIOLOGY

Credits : 4 **Semester: I**
Course Code : FST112 **No. of Lecture hours: 4 hrs /week**
Course Objectives:

- To study the role and significance of microorganisms in food,
- Recognize important microorganisms affecting food quality and safety,
- Identify methods of microorganism control to preserve food and make food consumption safe,

UNIT-I: Introduction to Microbiology

- Introduction to microbiology; Microorganisms – Definition, Classification
- Microbial growth pattern
- Microbial growth in food:
  - Intrinsic, extrinsic and implicit factors
  - survival of microorganisms in foods
  - Effect of injury on growth or survival.
- Biochemical changes - fermentation, putrefaction and lipolysis
- Antagonism and synergism in microorganisms.

UNIT- II: Microbiology of Foods

- Causes of spoilage and classification of foods by ease of spoilage;
- Chemical changes caused by micro-organisms;
- Contamination and spoilage of foods:
  - Milk & Milk products
  - Fruits& vegetables products
  - Grains and oilseeds
  - meat and poultry

UNIT- III: Microbes - Health & Hygiene

- Food poisoning
- Food borne infections
- Microbial toxins
- Food hygiene and sanitation control:
  - Methods to control microorganisms
    (Physical, Chemical, Thermal and Non- Thermal methods)

Unit V Microbial Fermentation & Industry

- Fermentation – Principles, systems, applications
- Production of microbial proteins, lipids, polysaccharides, vitamins
- Cell immobilization and applications
- Pre and probiotics cultures; Utilization and disposal of industrial wastes through microorganisms; use of genetically modified microorganisms in food processing

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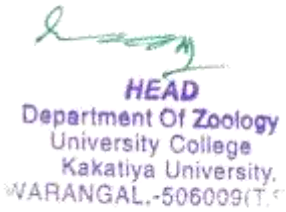
COURSE OUTCOME:

- By the end of the course, students will come to know the importance of microorganisms and their role in food.

Suggested Readings:

- Banawart GJ. 1989. *Basic Food Microbiology*. 2nd Ed. AVI Publ.
- Frazier J & Westhoff DC. 1988. *Food Microbiology*. 4th Ed. McGraw Hill.
- Garbutt J. 1997. *Essentials of Food Microbiology*. Arnold Heinemann.
- Jay JM, Loessner MJ & Golden DA. 2005. *Modern Food Microbiology 7* Ed.Springer.
- Ray B. 2004. *Fundamentals of Food Microbiology*.3rd Ed. CRC.
- Robinson RK. (Ed.). 1983. *Dairy Microbiology*. Applied Science.
- Steinkraus KS. 1996. *Handbook of Indigenous Fermented Foods*. Marcel Dekker.



(PAPER-III)

TECHNOLOGY OF CEREALS, LEGUMES AND OIL SEEDS

Credits : 4 **Semester: I**

Course Code : FST113 **No. of Lecture hours: 4 hrs /week**

Course Objectives:

- To teach technology of milling of various cereals
- To impart technical knowledge on refining of oilseeds
- To understand the basic composition and structure of cereals and legumes

UNIT-I

RICE: General Introduction, rice production.

- Rice structure, proximate Composition, Nutritive value and distribution of various chemical constituents in rice grain: Methods of studying quality of Rice with special reference to cooking quality: Changes during aging of rice, accelerated aging of rice.
- Methods of enrichment of rice with nutrients like vitamins and minerals :Parboiling of rice
- Principle process and Methods of parboiling, economical and nutritional advantages of parboiling.
- Rice Milling operations; cleaning and milling machinery, Degree of Milling, Milling effect on nutrition and quality of rice; SEM process of rice milling.

UNIT-II

WHEAT:

- General introduction, wheat production, wheat varieties, types and grades of Wheat. Nature of Wheat grain, structure, chemical composition and nutritive values.
- Milling of wheat – general principles and Machine operations.
- Roller flour milling Operations:-Principles and machinery operation including break system, reduction system, purification and Air fractionation of flours, etc.
- Flour and flour treatment; Utilization of by-products of wheat milling.
- Dough Rheology:- Introduction, basic concepts to dough chemistry.

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UNIT-III

LEGUMES: Proximate composition, anti nutritional factors, processing methods.

CORN/MAIZE:

- General introduction, Corn production, types and grades of Corn.
- Nature of grain, structure of grain, proximate composition and Nutritive value;
- Dry Milling of corn; general principles and machine operations.
- Wet milling operation of corn; general principles and machine operations
- Industrial applications of corn products- corn starch and corn syrups.

UNIT-IV

MILLETS:

- Types, nutritive value, value added products - Processing methods and importance in treatment of lifestyle diseases.

OIL SEEDS:

- Processing of oil seeds, refining of oil
- Processing of oil seed as vegetable protein isolates and concentrates and their uses
- Processing of oil seeds as vegetables milk like beverages.
- **COURSE OUTCOME:**

- Students will be able to understand the importance of cereals, legumes and oil seeds and also technology used in different milling industries.

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Suggested Readings:

- Manley DJR.1983. Technology of Biscuits, Crackers, and Cookies. Ellis Horwood.
- Matz SA. 1992. Bakery Technology and Engineering. 3rd Ed. Chapman & Hall.
- Pomeranz Y. 1987. Modern Cereal Science and Technology. MVCH Publ.
- Dubey SC. 2002. *Basic Baking*. The Society of Indian Bakers, New Delhi.
- Francis FJ. 2000. *Wiley Encyclopaedia of Food Science & Technology*. John Wiley & Sons.
- Pyler EJ. *Bakery Science & Technology*. 3rd Ed. Vols. I, II. Sosland Publ.
- Bent A, Bennion EB & Bamford GST. 1997. The Technology of Cake Making. 6th Ed. Blackie.

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PAPER IV

FERMENTED FOODS & BEVERAGES TECHNOLOGY

Credits : 4 **Semester: I**
Course Code : FST114 **No. of Lecture hours: 4 hrs/ week**

Course Objectives:

- To understand the principles of food fermentation technology
- To study the types of starters used in Food Industry
- To study the production of various fermented food

UNIT I
Fermented Foods

- Fermentation-Definition ,types of fermentation
- Fermented foods – sauerkraut, cucumber pickles, olive pickles.
- Oriental fermented foods – soy sauce, tofu, miso, tempeh, ontjons, hamanatto, natto.
- Traditional fermented foods – idli, dosa, etc.,
- fermented meat and milk products

UNIT II
Introduction to Beverages & Water

- Beverages – Classification, Types, Scope and importance
- status of beverage industry in India
- Packaged drinking water- definition, types,
    - manufacturing processes of raw and processed water
    - Quality evaluation of raw and processed water
    - methods of water treatment
    - BIS quality standards (for bottled water; mineral water, natural spring water, flavoured water, carbonated water)

UNIT III
Fruit & Speciality Beverages

- Fruits Beverages – Types, Definitions
- Manufacturing process and technology
- Note on Specialty beverages based on; tea, coffee, dairy-based beverages

Synthetic Beverages

- Synthetic beverages – technology of;
    - Still & carbonated beverages
    - Low-calorie and dry beverages
    - Isotonic and sports drinks
- Role of various ingredients of soft drinks
- Carbonation of soft drinks
- Storage and quality characteristics

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Unit IV

Fermented Beverages

- Fermented Beverages & distilled spirits
  - Types, manufacturing processes
  - Quality evaluation
- Role of yeast in technology of brewing process
- Equipments used for brewing and distillation

COURSE OUTCOME:

- Student will be able to understand the importance of fermentation and different micro organisms associated with foods.

SUGGESTED READINGS:

- Ravinder, A. Srinivas Maloo and Dr.Emmanuel, S.J. 2013. **Hand Book of Fermented foods and Beverages**, 1st edition. Mumbai: Himalaya Books Publishing House.
- Priest, F.G. and Stewart, G.G. 2006. **Handbook of Brewing**. 2nd edition. New Delhi: CRC Publication.
- Richard, P. 1981. **Commercial Wine Making - Processing and Controls**. New Delhi: AVI Publication.
- Prescott, S.C. and Dunn, C.G. 1959. **Industrial Microbiology**. 6th edition. New Delhi: Tata McGraw Hill.
- Varnam, A.H.and Sutherland, J.P. 1994. **Beverages: Technology, Chemistry and Microbiology**. Scotland: Chapman & Hall.
- Woodroof, J.G.and Phillips, G.F.1974. **Beverages: Carbonated and Non Carbonated**. New Delhi: AVI Publication.

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PRACTICALS

FOOD CHEMISTRY AND NUTRITION

Credits : 3 **Semester: I**
Course Code : FST115 **No. of Practical hours: 6hrs/week**

Course Objectives:

- To impart practical knowledge on analysis of various foods
- To evaluate proximate, physical and chemical parameters of various foods

1) Importance of sampling and techniques of sampling
2) Proximate analysis of foods
3) Estimation of Calorific value of foods
4) Estimation of Total solids; P_H; Acidity
5) Estimation of browning intensity
6) Determination of beta – carotene
7) Estimation of sugars, TSS in Degree Brix
8) Estimation of anti nutritional factors in foods
9) Estimation of Ash and acid insoluble ash
10) Estimation of starches, amino acids,
11) Estimation of Crude fibre in foods.
12) Determination of minerals-calcium, phosphorus, iron,
13) Estimation of vitamins-ascorbic acid, carotene, thiamine.
14) Analysis of lipids-saponification value, acid value, peroxide and iodine value.
15) Determination of starch and pectic substances using different methods.

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PRACTICALS

PAPER-15

FOOD MICROBIOLOGY

Credits : 3 **Semester: I**
Course Code : FST116 **No. of Practical hours: 6hrs/week**

Course Objectives:

- To impart practical knowledge on microbial analysis of various foods
- To evaluate shelf life of processed foods

1) Microscopy and micrometry.
2) Preparation of nutrient media,
3) Sterilization and inoculation techniques,
4) Isolation of pure culture,
5) Microscopic examination of bacteria, and yeast and molds
6) Standard plate count
7) Yeast and mould count
8) Spore count
9) Detection and enumeration of pathogenic and indicator organisms in food
10) MPN of coli forms;
11) Enumeration of physiological groups- psychrophile, thermodurics, osmophiles and halophiles.
12) Microbial examination of natural food products
13) Identification of food pathogen in water, milk, cereals, pulses, oilseeds, meat and poultry.
14) Evaluation of microbiological quality of commonly consumed street foods.

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PRACTICALS

PAPER-III

FERMENTED FOODS AND BEVERAGES TECHNOLOGY

Credits : 3 **Semester: I**
Course Code : FST117 **No. of Practical hours: 6hrs/week**

Course Objectives:

- To impart practical knowledge on processing of fruit beverages
- To evaluate physical and chemical parameters of water

1. Physical and Chemical analysis of raw water quality
2. microbiological analysis of raw water quality;
3. Preparation of regional fruit juices;
4. Preparation of whey-based beverages;
5. preparation of iced and flavored tea beverage;
6. Preparation of carbonated soft drinks
7. Preparation of noncarbonated drinks
8. Preparation of wine and beer
9. Preparation of soy milk
10. Preparation of fruit milkshakes
11. Preparation of herbal beverages
12. Visit to relevant processing units.

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II SEMESTER

PAPER I
PRINCIPLES OF FOOD ENGINEERING

Credits : 4 **Semester: II**
Course Code : FST121 **No. of Lecture hours:4 hrs/week**

Course Objectives:

- To apply knowledge of basic sciences, engineering sciences and applied engineering to design, adapt, innovate technology to process food raw materials and develop new products.
- To train students with extensive research capabilities, enabling them to propose projects to solve problems related to the food industry and point to the scientific, technological, economic and social development of their local, regional, and national levels.

Unit -1

Unit operation in food engineering, Units and dimensions; Mass and Energy balance; fluid flow - Fluid statics, fluid dynamics, measurement of rate of flow of fluids.

Process heat transfer- modes of heat transfer - conduction, convection and radiation. Overall heat transfer, Fourier's law, heat exchange equipment, natural convection, forced convection.

Unit 2

Thermal processing- evaporation - introduction, different evaporator equipments; Drying – introduction, equipment; Blanching; Pasteurization; sterilization; distillation – introduction, theory, general equipment for distillation; and crystallization – introduction, theory of crystallization, equipment.

Unit -3

Mechanical Separation- filtration – introduction, mechanisms of filtration, factors influencing filtration, filter media and filter aids, equipments; Ultra filtration/Reverse Osmosis; Centrifugation – introduction, theories of centrifugation, classification of centrifuges, equipment.

Unit-4

Mechanical handling- conveying and elevation – introduction, equipment; size reduction – introduction, mechanisms of size reduction, modes of stress applied in size reduction, equipment; size separation – introduction, equipment for size separation; Mixing – introduction, equipment for mixing solids, mixing vessels for liquids, mixing devices, equipment, mixing of semi solids, equipment.

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COURSE OUTCOME:

- Student will be able to understand basic concepts and their application in industries.

Suggested readings:

- Basics of Food Engineering, Romeo Toledo
- Brennan JG, Butter JR, Corell ND & Lilly AVE. 1990. *Food Engineering Operations*. Elsevier.
- Charm SE, McCabe WL, Smith JC &Harriott P.1993. *Unit Operations of Chemical Engineering*. McGraw Hills.
- Earle RL. 1985. *Unit Operations in Food Processing*. Pergamon Press.
- Fellows P. 1988. *Food Processing Technology*. VCH Ellis Horwood.
- Heldman DR & Singh RP.1995. *Food Process Engineering*. AVI Publ.
- McCabe WL & and Smith JC. 1971. *Fundamental of Food Engineering*. AVI Publ.
- Sahay KM & Singh KK. 1994. *Unit Operation of Agricultural Processing*. Vikas Publ. House.
- Singh RP &Heldman DR. 1993. *Introduction to Food Engineering*. Academic Press.

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PAPER II

TECHNOLOGY OF MILK AND MILK PRODUCTS

Credits : 4 **Semester: II**
Course Code : FST122 **No. of Lecture hours: 4 hrs/week**

Course Objectives:

To impart skills in the application of biological, chemical, biochemical, physical and engineering sciences in processing and preservation of milk and milk products;

UNIT I

Present status of milk & milk products in India and abroad; market milk-Composition of milk of various species, quality evaluation and testing of milk, procurement, transportation and processing of market milk, cleaning & sanitization of dairy equipments. Special milks such as flavoured, sterilized, recombined & reconstituted toned & double toned.

UNIT II

Condensed milk- Definition, methods of manufacture, evaluation of condensed & evaporated milk; dried milk- Definition, methods of manufacture of skim & whole milk powder, instantiation, physiochemical properties, evaluation, defects in dried milk powder.

Cream- Definition, classification, composition, cream separation, sampling, neutralization, sterilization, pasteurization & cooling of cream, evaluation, defects in cream;

UNIT III

Butter- Definition, composition, classification, methods of manufacture, theories of churning, evaluation, defects in butter.

Cheese: Definition, composition, classification, methods of manufacture, cheddar, swiss, cottage and processed cheese, evaluation, defects in cheese.

UNIT IV

Ice cream- Definition, composition and standards, nutritive value, classification, methods of manufacture, evaluation, defects in ice cream, and technology aspects of softy manufacture.

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Indigenous milk products - Present status, method of manufacture of yoghurt, dahi, khoa, burfi, kalakand, gulabjamun, rasogulla, shrikhand,chhana, paneer, ghee, lassi etc; probiotic milk products.

COURSE OUTCOME:

Student will be able to understand the technology behind the production of various dairy products.

Suggested Readings:

- Aneja RP, Mathur BN, Chandan RC & Banerjee AK. 2002. *Technology ofIndian Milk Products*. Dairy India Publ.
- De Sukumar,1980. *Outlines of Dairy Technology*. Oxford Univ. Press.
- Rathore NS *et al.* 2008. *Fundamentals of Dairy Technology - Theory &Practices*. HimanshuPubl
- Web BH, Johnson AH &Lford JA. 1987. *Fundamental of Dairy Chemistry*. 3rd Ed. AVI Publ.
- Spreer E. 1993. Milk and Dairy Products. Marcel Dekker.
- Walstra P. 1999. Dairy Technology. Marcel Dekker.

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PAPER III

FRUIT AND VEGETABLE PROCESSING & PRESERVATION TECHNIQUES

Credits : 4 **Semester: II**
Course Code : FST123 **No. of Lecture hours: 4 hrs /week**

Course Objectives:

- To study the application of food processing and preservation principles and technologies in the processing, preservation, extension of shelf life and value addition of fruit and vegetable products
- To impart knowledge and understanding of the basic post harvest biological, chemical, physiological and metabolic processes and changes in fruits and vegetables.

Unit I

Introduction to Horticulture

- Indian and global scenario on production and processing of fruits and vegetable
- General composition of fruits and vegetables and their nutritive value.
- Maturity indices and standards for selected fruits and vegetables.
- Post harvest changes in fruits and vegetables.
- Commodity pre-treatment - chemicals, wax coating, pre-packaging, UHT and irradiation.
- Quality requirements of raw materials for processing.
- Packaging house operations.

UNIT II

Fruit & Vegetable Processing

- Processing for pulp, puree and concentrates, pickles and sauces from different fruits and vegetables.
- Processing of fruits for candies, bars, toffees, jams and jellies using locally available fruits.
- Dehydration of fruits and vegetables using various drying technologies like sun drying, solar drying (natural and forced convection) osmotic, tunnel drying, fluidized bed drying, freeze drying, convectional and adiabatic drying. spray drying.

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UNIT III

Introduction to preservation & High Temperature Processing

- Scope of Food processing and preservation in India
- Principles and methods of food preservation.
- Preservation by chemicals-Preservatives, types, chemical preservatives used in different processed foods and their functions. Permissible limits and safety aspects
- Processing and preservation by heat; canning, blanching, pasteurisation, sterilisation
- Microwave heating, extrusion cooking
- Preservation of food by fermentation

UNIT IV

Low Temperature Processing

- Processing and preservation by low-temperature
    - refrigeration
    - freezing-types of freezing

New Techniques of Preservation

- Processing and preservation by non-thermal methods
    - Irradiation, Hurdle technology, high pressure processing, pulsed electric field, Membrane technology.
- Nanotechnology: Principles and applications in foods

COURSE OUTCOME

- Student will be able to understand different processing and preservation techniques.

Suggested readings:

- Banerjee B. 2002. *Tea Production and Processing*. Oxford Univ. Press.
- Minifie BW. 1999. *Chocolate, Cocoa and Confectionery Technology*. 3rd Ed. Aspen Publ.
- NIIR. 2004. *Handbook on Spices*. National Institute of Industrial Research Board, Asia Pacific Business Press Inc.
- Sivetz M & Foote HE. 1963. *Coffee Processing Technology*. AVI Publ.
- Kadar AA.1992. *Post-harvest Technology of Horticultural Crops*. 2nd Ed. Universiity of California.
- Lal G, Siddappa GS &Tandon GL.1986. *Preservation of Fruits and Vegetables*. ICAR.

PAPER IV

TECHNOLOGY OF MEAT, FISH, POULTRY &THEIR PRODUCTS

Credits : 4 **Semester: II**
Course Code : FST124 **No. of Lecture hours: 4 hrs /week**
Course Objectives:

- To study about the processing of meat and preservation of meat by various techniques
- To study about processing of poultry and sea foods
- To provide insight into the functions and areas of responsibility of meat inspection.

Unit-I

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. Stunning types and Slaughtering house operations of animals, inspection and grading of meat.

Unit-II

Factors affecting post-mortem changes. Factors affecting meat quality. Preservation of meat. Meat tenderization. Meat plant sanitation and safety. Modern abattoirs and design of facilities - typical layout and features. Microbiology & storage of meat .Meat products and it's by- products. Byproduct utilization. Packaging of meat.

Unit - III

Structure, composition, nutritive value and functional properties of eggs and its preservation by different methods. Processing of egg (egg powder manufacturing). Factor affecting egg quality and measures of egg quality. Packaging of eggs.

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Unit-IV

Types of fish, composition, structure, post-mortem changes in fish. Fish processing and preservation: Fish by – products – shrimp and its processing.

Poultry industry in India. Classes of poultry meat. Processing of poultry. Commercial methods of slaughtering , dressing. Microbiology of poultry meat, spoilage and its control. Preservation methods of poultry meat. By products of poultry meat and packaging of poultry products.

COURSE OUTCOME

- Student will be able to understand the importance of meat, preservation and processing into different products.

Suggested Readings:

- Forrest JC. 1975. *Principles of Meat Science*. Freeman.
- Govindan TK. 1985. *Fish Processing Technology*. Oxford & IBH.
- Hui YH. 2001. *Meat Science and Applications*. Marcel Dekker.
- Kerry J. *et al.* 2002. *Meat Processing*. Woodhead Publ. CRC Press.
- Levie A. 1984. *Meat Hand Book*. 4th Ed. AVI Publ.
- Mead M. 2004. *Poultry Meat Processing and Quality*. Woodhead Publ.
- Mead GC. 1989. *Processing of Poultry*. Elsevier.
- Pearson AM & Gillett TA. 1996. *Processed Meat*. 3rd Ed. Chapman & Hall.

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PRACTICALS

PAPER-26

PRINCIPLES OF FOOD ENGINEERING

Credits : 3 **Semester: II**
Course Code : FST125 **No. of Practical hours: 6hrs/week**

Course Objectives:

- To impart practical knowledge on thermal properties of foods
- To impart practical knowledge on flow of fluids

1) Determination of viscosity of Newtonian fluid and Non Newtonian fluids
2) Design of pumping systems
3) Determination of thermal properties of foods - thermal conductivity, thermal diffusivity, calorific value and specific heat
4) Calculation of freezing time for some typical foods
5) Study of different types of freezers
6) Calculation of thermal process time in canning of some foods
7) Determination of 'U' for PHE
8) Determination of 'U' for SSHE
9) Study of blast freezer
10) Visit to Food Processing Plants.

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PRACTICALS

PAPER-27

TECHNOLOGY OF MILK AND MILK PRODUCTS

Credits : 3 **Semester: II**
Course Code : FST126 **No. of Practical hours: 6hrs/week**

Course Objectives:

- To acquaint students withpractical based approach of activities from raw milk reception to delivery of the packaged milk products
- To impart knowledge on processing and preservation of various milk products
- To analyse physical,chemical and microbiological parameters of raw milk and processed milk

1) Study on basics of reception of milk at the plant;
2) platform tests in milk;
3) estimation of fat and SNF in milk;
4) Operation of LTLT & HTST
5) Pasteurization; Preparation of special milks;
6) Cream separation & standardization of milk;
7) Preparation and evaluation of table butter, icecream,cheese and indigenous milk product such as khoa, chhana, paneer,ghee, rasogulla, gulab jamun, shrikhand, lassi, burfi etc.;
8) Visit to dairy plants.

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PRACTICALS

PAPER-III

TECHNOLOGY OF FRUIT AND VEGETABLE PROCESSING

Credits : 3 **Semester: II**

Course Code : FST127 **No. of Practical hours: 6hrs/week**

Course Objectives:

- To acquaint students with practical based approach on processing of regional fruit and vegetables in to processed products
- To impart knowledge on preservation of fruit and vegetable products
- To analyse physical,chemical and microbiological parameters of fruit and vegetable products

1) Evaluation of pectin grade.
2) canning of mango/guava/papaya
3) Preparation and quality evaluation of fruit jam and fruit jelly
4) Fruit marmalade; fruit preserve and candy
5) Fruit RTS, squash, syrup preparation
6) Processing of tomato products
7) Preparation of fruit cheese
8) Preparation of pickle, mixed pickle
9) Preparation of dehydrated vegetables/ fruits
10) Visit to vegetable, fruit and vegetable processing Units

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III SEMESTER

PAPER-I

FOOD SAFETY, QUALITY CONTROL & MANAGEMENT SYSTEMS

Credits : 4 **Semester: III**
Course Code : FST211 **No. of Lecture hours: 4 hrs/week**
Course Objectives:

The objectives is to introduce the principles and methods of Food Quality Control and Assurance, principles and selection of panelists for sensory evaluation and Quality Management System and existing food Standards (ISO).

UNIT-I

Introduction to food safety

- Introduction to food safety: Definition of food safety, food safety issues, factors affecting food safety. Safe food and importance of safe food
- Food Contamination; Types of food contamination, harmful effects and control.
- Food adulteration: Definition, common adulterated foods and harmful effects of adulterants
- Risk analysis- An introduction to risk analysis, risk assessment, risk management, risk communication

UNIT-II

Concepts of QC, QA & Quality Management

- Concept of quality: Quality attributes- physical, chemical, nutritional, microbial.
- Quality control and Quality assurance- Objectives, importance and functions.
- Total Quality Management.
- Pre-requisite programmes- good hygienic practices, good manufacturing practices
- Hazard analysis critical control point: Definition, principles, development and application of HACCP plan.

UNIT-III

Global and domestic Food Safety Standards

- ISO 22000:2005-Food safety management system
- ISO 9001:2000-Quality management system
- Global scenario- codex alimentarious commission (CAC)
- Auditing
- Domestic accrediating organisations: FSSAI, AGMARK, BIS

UNIT-IV

Sensory Evaluation:

- Sensory analysis: Introduction, general testing conditions,
- Requirements of sensory laboratory, factors influencing sensory measurements.
- Sensory quality parameters – selection of sensory panelists.
- Sensory evaluation tests- Subjective and objective test of sensory parameters.
- Flavor profile tests;
- Statistical analysis of sensory data

Course Outcomes:

- Upon completion of this course, the student will be able to understand the principles and methods of Quality Control and Assurance in foods, understand the principles of sensory evaluation, understand the principles of HACCP in different food processing. (Skills) carry out sensory evaluation of a newly developed product, identify hazards and critical control points of different existing production processes

References:

- Amerine MA, Pangborn RM & Rosslos EB. 1965. *Principles of Sensory Evaluation of Food*. Academic Press.
- Early R.1995.*Guide to Quality Management Systems for Food Industries*. Blackie Academic.
- Furia TE.1980. *Regulatory status of Direct Food Additives*. CRC Press.
- Jellinek G. 1985. *Sensory Evaluation of Food - Theory and Practice*. Ellis Horwoood.
- Krammer A & Twigg BA.1973. *Quality Control in Food Industry*. Vol. I, II. AVI Publ.
- Macrae R, Roloson R & Sadlu MJ. 1994. *Encyclopedia of Food Science & Technology & Nutrition*. Vol. XVI. Academic Press.
- Piggot J.R. 1984. *Sensory Evaluation of Foods*. Elbview Applied Science.
- Ranganna S. 2001. *Handbook of Analysis and Quality Control for Fruit and Vegetable Products*. 2nd Ed. Tata-McGraw-Hill.
- Export/Import policy by Govt. of India.

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PAPER-II

APPLIED STATISTICS

Credits : 4 **Semester: III**
Course Code : FST212 **No. of Lecture hours: 4 hrs/week**

Course Objective:

To impart knowledge about elementary statistical methods, samples and populations, frequency distributions, correlations, random sampling, linear regression and correlation, Chi-square, T-test, ANOVA are studied.

Unit-I

Measures of central tendency-mean, mode, median for grouped and ungrouped data-merits and demerits.

Measures of dispersion-range-quarterly deviation-mean deviation-standard deviation-meris and demerits for grouped and ungrouped data-coefficient of variation-simple problems.

Unit-II

Correlation-types of correlation-scatter diagram-Karl Pearsons coefficient of correlation-rank correlation-non repeated and repeated ranks-simple problems.

Regression lines-regression equations and fitting of linear regression equation of Y on X and X on Y-simple problems

Unit-III

Chi-Square Test: Chi-Square test for goodness of fit-chi-square test for independence of attributes-Yates correction.

T-test:-t test for single mean-t-test for two means-paired t-test:-t test for significance of the correlation of coefficient.

Unit-IV

Sampling-Types of sampling-purposive sampling-random sampling and stratified sampling-definition of null hypothesis-alternative hypothesis-type-I error-Type II error-level of significance Analysis of Variance-F-Test-analysis of variance-assumptions-ANOVA in one way classification and two way classification-simple problems

Course Outcomes:

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Upon completion of this course, the student will have the ability to

- Analyze statistical data graphically using frequency distributions and cumulation frequency distributions
- Analyze statistical data using measures of central tendency and Chi-square test for goodness of fit and Chi-square test for independence.
- Examine large sample tests of hypothesis including elements of a hypothesis test, type I and II errors, and using p values to indicate significance tests for population proportion and difference between two population proportions.

Reference:

1. Fundamentals of Mathematical statistics: S.C. Gupthaand V.K. Kapoor, 2000, sulthan /Chand "& Sons, New Delhi.
2. Stastistical Method: S.C. Gupthaand V.K. Kapoor, 2000, sulthan /Chand "& Sons, New Delhi.
3. Problems and solution in statistics: V.K.Kapoor 2000, 3rd, edition sulthan chand & Sons, New Delhi.

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ELECTIVE I (A): PAPER-III

TECHNOLOGY OF SUGAR CONFECTIONERY & CHOCOLATE PROCESSING

Credits : 4 **III Semester**

Course Code : FST213 **No. of Lecture hours: 4 hrs/week**

Objectives:

- Understanding status of confectionery industry in India
- To learn the technologies of confectionery products.
- To know about innovations in this sector.

UNIT-I

Introduction to Confectionery Industry

- Raw Materials for Confectionery Manufacture
    - Important properties – Sugar, glucose syrup, Dried milk products, cocoa, Speciality fats, Emulsifiers, Nut kernels, Alcoholic ingredients and other minor ingredients.
- General technical aspects of industrial sugar confectionery manufacture.
- Confectionery – composition, structure
- Quality aspects

UNIT-II

Manufacture of Confectionery I

- Manufacture of Caramel
- Manufacture of Toffee and fudge
- Manufacture of Liquorices paste
- Manufacture of Count Lines
- Manufacture of Aerated confectionery
- High boiled sweets– Ingredients, Methods of manufacture– Product types

UNIT-III

Manufacture of Confectionery II

- Manufacture of Lozenges
- Manufacture of Fruit confections
- Manufacture of sugar panned sweets
- Manufacture of gums & jellies
- Chewing gum Technology
- Flour confectionary

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UNIT-V

Chocolate Processing

- Chocolate Processing Technology:
  - Cocoa bean – harvesting, processing
  - production of cocoa liquor
  - cocoa butter processing
  - cocoa butter substitutes.
- Manufacture of chocolate bars and covered confectionary
  Molding,enrobing,panning,tempering
  Other chocolate processes
- Quaity control of chocolates.

Course Outcomes:

- By the end of the course, the students will have Knowledge in the areas of confectionary product processing

SUGGESTED READING

- Jackson, E.B.1999. **Sugar Confectionery Manufacture**. 2nd Edition. New york: Aspen Publication.
- Junk, W.R. and Pancost, H.M. 1973**. Hand Book of Sugars for Processors**. Chemists and Technologists. New Delhi: AVI Publications.
- Francis, F.J. 2000. **Wiley Encyclopaedia of Food Science & Technology**. India: John Wiley & Sons.

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ELECTIVE I (B): PAPER-III

TECHNOLOGY OF SPICES, CONDIMENTS & PLANTATION CROPS

Credits : 4 **Semester: III**
Course Code : FST **No. of Lecture hours: 4 hrs/week**

Objectives:

- Understanding status of spice industry in India
- To learn the technologies of spices and condiments.
- To know about innovations in this sector.

UNIT I Spice Science & Technology I

- Major spices: Pepper, cardamom, ginger, chili and turmeric
- Oleoresins and essential oils; method of manufacture
- chemistry of the volatiles
- enzymatic synthesis of flavour identicals
- quality control; fumigation
- irradiation of spices

UNIT-II Spice Science & Technology 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 & Chicory: Science & Technology

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

UNIT IV Tea: Science & Technology

- Tea: Occurrence, chemistry of constituents; harvesting
- types of tea – green, oolong and CTC
- chemistry and technology of CTC tea

- manufacturing process for green tea & black tea manufacture
- instant tea manufacture
- quality evaluation and grading of tea

Course Outcomes:

- By the end of the course, the students will have Knowledge in the areas of spices processing

References:

- Banerjee B. 2002. *Tea Production and Processing*. Oxford Univ. Press.
- Minifie BW. 1999. *Chocolate, Cocoa and Confectionery Technology*. 3rd Ed. Aspen Publ.
- NIIR. 2004. *Handbook on Spices*. National Institute of Industrial Research Board, Asia Pacific Business Press Inc.
- Sivetz M & Foote HE. 1963. *Coffee Processing Technology*. AVI Publ.

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ELECTIVE II (A) PAPER-IV
BAKING SCIENCE AND TECHNOLOGY

Credits : 4 **Semester: III**
Course Code : FST214 **No. of Lecture hours: 4 hrs/week**

Course Objectives:

- To impart knowledge on Bakery sector of food processing about different raw materials used and their role and different equipment, processing of different Products and their packaging & Quality maintenance.

UNIT I

Baking Technology I

- Bakery industry in India; Wheat composition, structure and types of wheat.
- Milling of wheat in to flour- composition, types and grades of flour. Quality evaluation of flour.
- Wheat flour proteins and importance of gluten in manufacture of bakery products.
- HACCP in bakery industry.
- Machineries used in bakery industry

UNIT II

Baking Technology II

- Bakery industry; raw materials and quality parameters;
- dough development; methods of dough mixing;
- dough chemistry;
- rheological testing of dough-Farinograph, Mixograph, Extensograph, Amylograph / Alveo consistograph, Rapid Visco Analyzer, Falling number, stickiness tester.
- Additives used in bakery products – flour improvers and bleaching agents.

UNIT III

Bread:

- Ingredients used and role of ingredients in manufacture of bread
- Manufacture process of bread,
- bread spoilage and staling,
- packaging of bread

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Biscuits:

- Classification of biscuits,
- Ingredients used and role of ingredients in manufacture of biscuits
- -Methods of mixing dough.
- processing technology of soft dough and hard dough biscuits.
- packaging of biscuits.

UNIT IV

Cakes:

- Classification of cakes,
- Ingredients used and role of ingredients in manufacture of cakes,
- formula balance in cakes,
- Processing of cakes ,
- cake faults and remedies.

Wafers:

- Ingredients used and role of ingredients in manufacture of wafers.
- Processing of wafers
- Frozen dough products

Course Outcomes:

By the end of the course, the students will have Knowledge in the areas of Bakery product processing

Suggested Readings

- Manley DJR.1983. Technology of Biscuits, Crackers, and Cookies. Ellis Horwood.
- Matz SA. 1992. Bakery Technology and Engineering. 3rd Ed. Chapman & Hall.
- Pomeranz Y. 1987. Modern Cereal Science and Technology. MVCH Publ.
- Dubey SC. 2002. *Basic Baking*. The Society of Indian Bakers, New Delhi.
- Francis FJ. 2000. *Wiley Encyclopaedia of Food Science & Technology*. John Wiley & Sons.
- Pyler EJ. *Bakery Science & Technology*. 3rd Ed. Vols. I, II. Sosland Publ.

ELECTIVE II :(B) PAPER-IV

EXTRUSION TECHNOLOGY

Credits : 4 **Semester: III**
Course Code : FST 214 **No. of Lecture hours: 4 hrs/week**
Course Objectives:

- To impart knowledge on extrusion technology of food processing about different raw materials used and their role and different equipment, processing of different Products and their packaging & Quality maintenance.

UNIT I

Introduction to Extrusion

Extrusion: definition, introduction to extruders, Extruders in the food industry – History, uses, principles and types – Chemical and nutritional changes in food during extrusion.

Single screw extruder: principle of working, net flow, factors affecting extrusion process, co-kneaders

UNIT II

Extruders

Twin screw extruder: counter rotating and co-rotating twin screw extruder. Process characteristics of the twin screw extruder – heat transfer and energy balances. Problems associated with twin screw extruder. Interpreted flight expanders/ extruders, dry extruders.

UNIT III

Pre Conditioning & Practical considerations

Pre-conditioning of raw materials used in extrusion process, Pre-conditioning operations and benefits of pre-conditioning,

Practical considerations in extrusion processing: pre-extrusion processes, Extrusion cooking technology, post extrusion processes

UNIT IV

Breakfast Cereals & TVP

Breakfast cereals; Texturized vegetable proteins – Introduction, Definition, classification, Formulation and processing technology. Types of processes: traditional and extrusion methods.

Snack food extrusion: Direct expanded (DX) and third generation (3G) Snacks: types, available brands, co- extruded snack and indirect-expanded products

Course Outcomes:

By the end of the course, the students will have Knowledge in the areas of extruded products processing

Suggested Readings:

- Edmund WL. Snack Foods Processing.
- Frame ND .1994.The Technology of Extrusion Cooking. Blackie Academic.
- Gordon BR.1997. Snack Food.AVI Publ

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PRACTICALS

FOOD PROCESSING LAB-42

PAPER-I

Credits : 4 **II Year / I Semester**
Course Code : FST225 **No. of Lecture hours: 09 hrs/week**

1. Physical and chemical analysis of flour
2. Determination of dough relaxation constants and their interpretation
3. Effect of mixing method on the quality of baked product;
4. Effect of mixing time on the rheological characteristics of dough;
5. Effect of mixing time on the crispness and firmness of biscuits;
6. Effect of additives on the quality and textural characteristics of bakery products;
7. Development and quality evaluation of baked products based on composite flour;
8. Preparation and quality evaluation of bread,biscuits,cakes, croissant, doughnuts, and pizza base
9. Visit to bakery industries.

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PRACTICALS

FOOD PROCESSING LAB-II

PAPER-II

Credits : 4 **II Year / I Semester**
Course Code : FST226 **No. of Lecture hours: 09 hrs/week**

1. Analyis of sucrose
2. Analysis of confectionary products
3. Manufacturing of caramel
4. Manufacturing of boiled sweets
5. Manufacturing of toffee
6. Manufacturing of fudge
7. Preparation and Quality evaluation of Confectionery Products
8. Preparation of chocolate
9. Quality evaluation of chocolate products
10. Visit to confectionery industries

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IV SEMESTER

PAPER –I

ADVANCES IN FOOD PACKAGING

Credits : 4 **Semester: IV**
Course Code : FST221 **No. of Lecture hours: 4 hrs/week**

COURSE OBJECTIVES

The objectives of this course is to establish the different functions performed by packaging material. To inform about health implications of food-package interactions. To inform about packaging requirement for fresh and processed food for local and international markets

UNIT I

Introduction to Packaging Technology

- Packaging – Definition, objectives and functions
- Packaging requirements and selection of packaging materials
- Types of packaging materials and their properties
- Food packaging systems: Forms of packaging and Different packaging systems for foods
- Antimicrobial food packaging: system construction
- Factors affecting the effectiveness of antimicrobial packaging

UNIT II

Packaging Techniques

- Active and intelligent packaging – packaging techniques
- Current use of novel packaging techniques, Oxygen, ethylene and other scavengers and scavenging technology
- Non-migratory bioactive polymers (NMBP) in food packaging
- Advantages, limitations
- inherently bioactive synthetic polymers: types and applications
- Polymers with immobilized bioactive compounds

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UNIT III

Packaging Technology

- Evaluation of packaging material and package performance
- packaging equipment – Metering and filling of different foods –
- Aspetic filling of foods
- Labelling requirements
- Bar coding – Printing
- Package standards and regulation.

UNIT IV

Modern packaging systems

- Modern packaging systems: Green plastics for food packaging
- Developing novel biodegradable materials
- Modified atmospheric Packaging(MAP),
- Controlled atmospheric Packaging(CAP),
- Shrink Packaging
- Role of packaging in the supply chain

COURSE OUTCOME

- Student will be able to understand the need for packaging food, understand the various functions of food packages as influenced by their characteristics, understand the health implications of food-package interactions.

Suggested Readings

- Crosby NT, *Food Packaging: Aspects of Analysis and Migration Contaminants*1981. App. Sci. Publ.
- Kadoya T. (Ed). 1990. Food Packaging. Academic Press.
- Mahadeviah M & Gowramma RV. 1996. *Food Packaging Materials*. Tata McGraw Hill.
- Palling SJ. (Ed). 1980. *Developments in Food Packaging*. App. Sci. Publ.
- Painy FA. 1992. *A Handbook of Food Packaging*. Blackie Academic.

FOOD PRODUCT DEVELOPMENT AND ENTREPRENURSHIP

PAPER –II

Credits : 4 **Semester: IV**

Course Code : FST222 **No. of Lecture hours: 4 hrs/week**

Course Objective:

-This course is designed to provide students with a basic understanding of the product development process in the commercial food industry.

-The students develop and can systematically apply an entrepreneurial way of thinking that will allow them to identify and create business opportunities that may be commercialized successfully.

UNIT I

Introduction to Product Development

- Concept of product development
- product success and failure,
- factors for success
- process of product development, managing for product's success
- product development program
- Legal aspects of new product launch

UNIT II

Product Development Process

- The product development process
- product strategy
- product design and process development
- product commercialization
- product launch and evaluation
- knowledge for conversion of product concept to new product

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UNIT III

Entrepreneurship Development

- Entrepreneurship – Meaning, Functions of entrepreneur
- Characteristics of successful entrepreneur
- Role of entrepreneurship in economic development
- Generation, incubation and commercialization of business ideas
- Source of finance –Micro, Small, Medium entrepreneurship
- TSIPASS and Telangana food processing policy.

UNIT 1V

Principles of marketing

- Introduction to marketing- Marketing meaning
- Core concepts of marketing
- Marketing mix – concepts (4p's and 4 c's).
- Marketing research and customer relationship management.
- Product life cycle
- Consumer buying behavior(Cultural factors, Social factors, Personal and Psychological factors)

Course outcome:

By the end of the course, students will get basic knowledge on product development, entrepreneurship and different marketing stratergies

Suggested Readings

- Clarke & Wright W. 1999. *Managing New Product and Process Development*. Free Press.
- Earle R, Earle R & Anderson A. 2001. *Food Product Development*. Woodhead Publ.
- Fuller 2004. *New Food Product Development - from Concept to Market Place*. CRC.
- Principles of Marketing- *Phillip kotler*

PRACTICALS

FOOD PRODUCT DEVELOPMENT LAB

Credits : 4 **II Year / II Semester**

Course Code : FST223 **No. of Lecture hours: 08hrs/week**

1) Market survey of existing products
2) Idea generation and selection of topic
3) Cost analysis
4) Standardisation of product
5) Development of new product
6) Analysis of new products
7) Sensory evaluation
8) Marketing
9) Visit to startup company
10) Consumer feedback studies

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WARANGAL - 506 009, T.S.

HEAD
Department Of Zoology
University College
Kakatiya University,
WARANGAL.-506009(T.S)

MAJOR PROJECT WORK

Credits : 12 **Semester: IV**

Course Code : FST224 **No. of Lecture hours: 18hrs/week**

Objective:

- To develop research and project writing skills in students.

A research project will be allotted to each student after the III semester. They will be required to complete the data collection, analysis and writing of dissertation so as to submit it at the end of IV Semester and to present it at seminar.

The total allotted marks **300** are divided in the following way

- Internal Assessment (100 marks)
  - First seminar (**50** marks – in between 25 to 30 days after commencement of projetct).
  - Second seminar (**50** marks – in between 55 to 60 days after commencement project)..
- External Assessment (**200** marks)
  - The students should submit one page of synopsis on the project work for display on the notice board.
  - The project presentation is for 10 minutes followed by 05 minutes for discussion.
  - The student should submit a technical write-up on the project.
  - At least two teachers will be associated with the project seminar to evaluate students for the award of sessional marks which will be on the basis of performance in all the 3 items (synopsis, presentation, technical write-up).

Chairperson Board of Studies
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