Choice based Credit System (CBCS)
Scheme and course structure for
M.Sc Food Technology 4th semester effective from academic session 2015 and onwards

Course Code	Course Name	Hours			Total Credits
		L	T	P	
FT14401CR	TECHNOLOGY OF MILK AND MILK PRODUCTS	**4**	**0**	**0**	**4**
FT14402CR	TECHNOLOGY OF MEAT, FISH AND POULTRY PRODUCTS	**4**	**0**	**0**	**4**
FT14403CR	PROCESSING OF ANIMAL BASED FOODS (PRACTICAL)	**0**	**2**	**6**	**4**
FT14404EA	PROJECT WORK	**0**	**0**	**8**	**4**
FT14405EA	FOOD PLANT DESIGN: FRUITS AND VEGETABLES BASED	**1**	**2**	**0**	**2**
FT14406EA	FOOD PLANT DESIGN: CEREAL BASED	**1**	**2**	**0**	**2**
FT14407EA	FOOD PLANT DESIGN: DAIRY BASED	**1**	**2**	**0**	**2**
FT14408EA	FOOD PLANT DESIGN: MEAT BASED	**1**	**2**	**0**	**2**
FT14409EA	FOOD TOXICOLOGY	**3**	**2**	**0**	**4**
FT14410EA	FERMENTATION TECHNOLOGY	**3**	**2**	**0**	**4**
FT14411EO	SMALL SCALE PROCESSING OF FRUITS, VEGETABLES & CEREALS	**0**	**4**	**4**	**4**
Credits=28 Hours=54					

Course Code: FT14401CR

Course Name: TECHNOLOGY OF MILK AND MILK PRODUCTS (4+0+0)

Unit – I

- Dairy industry in India and its scope.
- Sources and composition of milk, nutritive value.
- Chemistry of Milk-Milk fat, proteins, lactose, vitimines, minerals & salts
- Factors affecting composition of milk.
- Processing of market milk- standardization, toning of milk, homogenization.

Unit – II

- Storage, transportation and distribution of milk. Pasteurization and sterilization.
- Milk products - Processing of cream, butter oil, condensed milk, evaporated milk, whole and skimmed milk.
- Cheese and its types,

Unit – III

- Production of Ice creams & its quality controle.
- Stater culture production & propogation for fermented milk products.
- Production of fermented milk products.
- Instantization of milk and milk products.

Unit – IV

- Judging and grading of milk and its products.
- In plant cleaning system.
- Quality standards of milk and milk products.
- Packaging of dairy products.
- By product utilization.

References:

1. Technology of Dairy Products by Early. R.
2. Outlines of Dairy Technology by S. K. De.
3. Chemistry and Testing of Dairy Products by Athestem.

Course Code: FT14402CR

Course Name: TECHNOLOGY OF MEAT, FISH AND POULTRY PRODUCTS (4+0+0)

Unit – I

- Scope of meat industry in India with special reference to J&K.
- Sources of meat, composition and nutritive value of meat.
- Structure of muscle. Microscopic structure of meat.
- Contraction and relaxation of muscle.
- Factors affecting meat production and quality.

Unit – II

- Slaughtering of animals and poultry.
- Inspection and grading of meat.
- Conversion of muscle to meat. Factors affecting post mortem changes in meat.
- Properties and shelf life of meat.
- Eating quality of meat ï colour, flavor, tenderness, juiceness and water holding capacity.
- Meat quality evaluation.
- Mechanical deboning.
- Meat tenderization and aging.
- Restructuring of meat products.
- Preservation of meat by freezing, curing, pickling and smoking of meat.

Unit - III

- Meat plant sanitation and safety.
- By product utilization of meat industry.
- Recent trends in meat processing.
- Traditional meat products of J&K.
- Structure, composition, nutritive value and functional properties of eggs.
- Factor affecting egg quality and measures of egg quality.
- Preservation of eggs by different methods. Preparation of egg powders.

Unit – IV

- Types of fish, composition, structure. Post mortem changes in fish.
- Handling of fresh water fish.
- Preservation of fish by freezing, glazing of fish, canning, smoking, freezing, irradiation and dehydration.
- Technology of production of fish sauce, fish sausage, fish meal and fish oil.

References:

1. Lawre. R. A. & Ledward, D. A. (2006). Lawres Meat Science 7th Ed. Woodhead Publishing Company, Cambridge, England.
2. Throntons Meat Hygiene.
3. Principles of Meat Science by Forest.
4. Developments in Meat Science by Lawrie.
5. Processed Meats by Pearsons.
6. Fish Processing Technology by George M. Hall.
7. Fish Processing Technology by Gopalkumar K. (ICAR ï publications).

Course Code: FT14403CR
Course Name: PROCESSING OF ANIMAL BASED FOODS (PRACTICAL) (0+1+3)

1. Survey of meat and fish products available in market.
2. To study slaughtering and dressing of meat animals.
3. Study of post-mortem changes.
4. Meat cutting and handling.
5. Evaluation of meat quality.
6. Preparation of various meat products such as: Meat pickle & cured meat
7. Meat emulsion and sausage manufacture.
8. Preparation and evaluation of traditional meat products.
9. Shelf-life studies on processed meat products.
10. Slaughtering of poultry.
11. Determination of meat to bone ratio in Chicken.
12. To evaluate freshness of fish.
13. To determine meat to bone ratio of fish.
14. Dressing of fish and calculation of dressing percentage.
15. Preparation of fish products such as fish cutlets, pickle, curry, tandoori fish.
16. Experiments in dehydration, freezing, canning, smoking and pickling of fish and meat.
17. Visit to local slaughterhouse.
18. Quality evaluation of eggs.
19. Preservation of eggs.
20. Functional properties of eggs.

Dairy Science

- Quantative estimation of milk constituents suchas moisture, total solids, fat.
- Determination of acidity of milk.
- Determination of specific gravity of milk.
- Platform tests on given samples of milk.
- Determination of adulterants in milk-water, urea, starch, sucrose etc.
- Detection of preservatives in milk.
- COB test.
- Visit to local milk processing plant.
- Preparation of common milk products
- Flavoured milks.
- Yoghurt.
- Butter.
- Ice-cream.
- **SEMINAR**

References:

1. Outlines of Dairy Technology by S. K. De
2. Chemistry and Testing of Dairy products by H.V. Atherton & J.A. Newlander
3. Milk and dairy Product Technology by Edger Spreer.
4. Dairy Chemistry by H.H. Sommer
5. Lawre. R. A. & Ledward, D. A. (2006). Lawres Meat Science 7th Ed. Woodhead Publishing Company, Cambridge, England.
6. Throntons Meat Hygiene.
7. Principles of Meat Science by Forest.
8. Developments in Meat Science by Lawrie.
9. Processed Meats by Pearsons.

Course Code; FT14404EA
Course Name: PROJECT WORK (0+0+4)

Course Code: FT14405EA
Course Name: FOOD PLANT DESIGN: FRUITS AND VEGETABLES BASED (1+1+0)

Unit I

- Scope of fruit/vegetable processing in J&K.
- Problems of fruit processing in J&K.
- Selection of site for fruit processing plant.
- Layout for a fruit processing plant.
- Building requirements for a fruit processing plant.
- Plant and machinery requirements for fruit processing.
- Water quality requirements for fruit processing.
- Environmental considerations, waste disposal and byproduct utilization.
- Financial requirements for setting up a fruit processing plant
- Techniques of financial analysis-Break-even analysis, Payback period.

Unit II

Project formulation for a fruit/vegetable processing plant.

Students will be required to formulate a detailed project report for setting up a fruit/ vegetable based processing plant. It may involve manufacture of products like juices, concentrates, jams, jellies, dehydrated products, canned products etc.

Project report should cover all the important areas like feasibility of location, land requirements, design of building, plant machinery, environmental issues, licensing, financial requirements, sources of finance and financial feasibility analysis.

References:

1. Industrial Engineering and Managementn by O. P. Khanna.
2. Institutional Food Management by Mohini Sethi
3. Food Plant Sanitation by Michael M. Cramer

Course Code: FT14406EA
Course Name: FOOD PLANT DESIGN: CEREAL BASED (1+1+0)

Unit I

- Scope of cereal processing in J&K.
- Problems of cereal based processing plants in J&K.
- Selection of site for cereal based processing plant.
- Layout for a cereal processing plant.
- Building requirements for a cereal based processing plant.
- Plant and machinery requirements for cereal processing.
- Environmental considerations, waste disposal and byproduct utilization.
- Financial requirements for setting up a cereal processing plant
- Techniques of financial analysis-Break-even analysis, Payback period.

Unit II

Project formulation for a cereal based processing plant.

Students will be required to formulate a detailed project report for setting up a cereal based processing plant. It may involve manufacture of products likebread, cookies, cakes, muffins etc.

Project report should cover all the important areas like feasibility of location, land requirements, design of building, plant machinery, environmental issues, licensing, financial requirements, sources of finance and financial feasibility analysis.

References:

1. Industrial Engineering and Managementn by O. P. Khanna.
2. Institutional Food Management by Mohini Sethi
3. Food Plant Sanitation by Michael M. Cramer

Course Code: FT14407EA
Course Name: FOOD PLANT DESIGN: DAIRY BASED (1+1+0)

Unit I

- Scope of milk processing in J&K.
- Problems of milk processing in J&K.
- Selection of site for milk processing plant.
- Layout for a milk processing plant.
- Building requirements for a milk processing plant.
- Plant and machinery requirements for milk processing.
- Water quality requirements for milk processing.
- Environmental considerations, waste disposal and byproduct utilization.
- Financial requirements for setting up a milk processing plant
- Techniques of financial analysis-Break-even analysis, Payback period.

Unit II

Project formulation for a milk processing plant.

Students will be required to formulate a detailed project report for setting up milk based processing plant. It may involve manufacture of products like dhahi, cheese, butter; processing and packaging of fluid milk, etc.

Project report should cover all the important areas like feasibility of location, land requirements, design of building, plant machinery, environmental issues, licensing, financial requirements, sources of finance and financial feasibility analysis.

References:

1. Industrial Engineering and Managementn by O. P. Khanna.
2. Institutional Food Management by Mohini Sethi
3. Food Plant Sanitation by Michael M. Cramer

Course Code: FT14408EA
Course Name: FOOD PLANT DESIGN: MEAT BASED (1+1+0)

Unit I

- Scope of meat processing in J&K.
- Problems of meat processing in J&K.
- Selection of site for meat processing plant.
- Layout for a meat processing plant.
- Building requirements for a meat processing plant.
- Plant and machinery requirements for meat processing.
- Water quality requirements for meat processing.
- Environmental considerations, waste disposal and byproduct utilization.
- Financial requirements for setting up a meat processing plant
- Techniques of financial analysis-Break-even analysis, Payback period.

Unit II

Project formulation for a meat processing plant.

Students will be required to formulate a detailed project report for setting up meat based processing plant. It may involve manufacture of traditional meat products like Rista, Goshtaba and their canning etc.

Project report should cover all the important areas like feasibility of location, land requirements, design of building, plant machinery, environmental issues, licensing, financial requirements, sources of finance and financial feasibility analysis.

References:

1. Industrial Engineering and Managementn by O. P. Khanna.
2. Institutional Food Management by Mohini Sethi
3. Food Plant Sanitation by Michael M. Cramer

Course Code: FT14409EA
Course Name: FOOD TOXICOLOGY (3+1+0)

Unit – I

- Introduction, history and scope of toxicology
- Toxicant exposure- routes of toxicant exposure and toxicant absorption
- Basic concepts of toxicology- Dose effect and response, dose response relationship, statistical concept of toxicity
- Toxicity testing.
- Toxicological testing methods
- Manifestation of organ toxicity.
- Carcinogenesis, mutagenesis and teratogenesis.
- Measurement of toxicity and toxicants.
- **Unit – II**
- Absorption, translocation and excretion of xenobiotics
- Biotransformation of bio xenobiotics- Biotransformation enzyme systems.
- Biotransformation reactions- Phase I and Phase II reactions
- Naturally occurring toxins in plant foods ï occurrence and denaturation.
- Naturally occurring toxins in foods of animal origin, sea food toxins ï occurrence, toxicity and management

Unit – III

- Food additives, general principles for use, safety assessment.
- Types of food additives and their toxics effect. Food colors, Sweeteners, Antioxidants, Acidulants, Flavoring agents, Antimicrobial agents
- Heavy metals, radio nucleotides and industrial containments.
- Food packaging containments.

- **Unit – IV**
- Poisonous forms of mushrooms
- Toxins produced during processing.
- Residues in animal products.
- Residues in plant products.
- Anti obesity food supplements and toxic effects.

References

1. Food Additives Toxicology by Joseph A. Maga.
2. Food Toxicology by Carl K.Winter
3. Food and Nutritional Toxicology by Stanly T. Omaye

Course Code: FT14410EA
Course Name: FERMENTATION TECHNOLOGY (3+1+0)

Unit I

- Introduction to fermentation processes-Biomass, enzymes & metabolite production.
- Process components: Batch, Continuous & Fed batch cultures.
- Kinetics & applications of batch, Continuous & fed batch process.
- Fermentation Media: Formulation, Carbon & Nitrogen sources, Oxygen requirements, antifoams & sterilization.

Unit II

- Bioreactors: Basic function, Design, Operation, Aeration, Agitation and sterilization.
- Types of Fermentation: Solid substrate & submerged Fermentation, Continuous & batch Fermentation, homo & hetero Fermentation.
- Enzyme immobilization: Methods & Advantages. Down Stream Processing.

Unit III

- Production of vitamins, amino acids, organic acids, enzymes, antibiotics, single cell proteins.

Unit IV

- Fermented foods: Benefits & nutritional value, Idly, Dosa, kaladi, Srikand, kefir, koumiss, cheese, Saurekraut, vinegar, soya fermentation products

References:

1. Fermented Foods of the world. (A Dictionary & Guide) ï by Geoffrey Champbell, Platt, Butterworths, London.

2. Industrial Microbiology by Brinton M miller & Warren Litsky. MGH.

3. Pickle & Sauce Making, Binsted, Devey & & Dakin (2nd edn), Food Trade Press Ltd, London.

Course Code: FT14411EO
Course Name: SMALL SCALE PROCESSING OF FRUITS, VEGETABLES & CEREALS (0+2+2)

Unit I

- Production of following products

1. Dried fruits & Vegetables
2. Juice, Squashes & Cordials
3. Sauces & Chutneys
4. Jams, Jellies & Marmalades
5. Pickles
6. Pastes, Purees & Ketchups
7. Fruit leather & Crystallized fruits
8. Bread
9. Cookies
10. Cakes

Unit-II (Tutorial)

- Production facilities for fruit, vegetable & cereal based processing plants:

1. Site
2. Building
3. Processing equipments
4. Services
5. Sanitation

Unit-III (Practical)

1. Preparation of squashes, Crush, Juices
2. Preparation of Jam, Candy
3. Preparation of Pickle
4. Preparation of Tomato Ketchup, Sauce, soup, pure.

Unit IV (Practical)

1. Preparation of Bread
2. Preparation of Cakes
3. Preparation of Cookies
4. Preparation of macroons

References:

1. Preservation of fruits & Vegetables by Siddappa etal 1999. ICAR, New Delhi
2. Preservation of Fruits & Vegetables by Srivastava & Kumar, 1996. Intl. Book publishing Co. Lucknow
3. Small Scale Fruit & Vegetable Processing & Products (Production methods, Equipment Assurance Practices) UNIDO Technology Manual.
4. Stanley P.Cauvain & Lindas S. Young. Baked Products. Blackwill Publishing.
5. Stanley P.Cauvain & Lindas S. Young. The Chorleywood Bread Process. CRC Publications.
6. Bakery Technology & Engineering by Samueal A. Matz.