

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

Semester-III

Course No.	Name of the Course	Credit	Remark
FPTCC-301	Technology of Meat, Poultry and Fish Processing	04	Core Course /MOOC
FPTCC-302	Practical	04	Core Course
FPTTEL-301B	Post Harvest Managements of Perishables	04	Elective
FPTTEL-301B	Food Processing and Environment		
FPTTEL-302A	Principles of Food Preservation	04	Elective
FPTTEL-302B	Food Additives, Nutraceuticals and Health Foods		
FPTIN-301	Summer Training (Four weeks)	04	Internship
FPTIER-301	Food Toxicants and Allergens	04	Interdepartmental Course
Semester Total		24	

FPTCC-301: Technology of Meat, Poultry and Fish Processing

04 Credit

Course Outcome:

- Students will get knowledge about structure of meat, pre and post mortem examination of meat and poultry.
- Students will acquaint with different techniques of meat and fish processing and preservation along with slaughter house by product utilization.
- Slaughtering, post mortem physico-chemicals changes knowledge will also be gained by students.

Unit I

An overview of meat, fish and poultry processing industries in India; Composition and Structure of meat muscles, Nutritive value of meat, fish and poultry products, Spoilage of meat products.

Unit II

Ante-mortem examination, slaughtering and post-mortem examination of meat and poultry. Postmortem carcass evaluation and storage. Postmortem physical and biochemical changes in meat.

Unit III

Freezing, refrigeration and freeze drying of meat. Smoking techniques. Biochemical changes during smoking and storage for smoked meat.

Unit IV

Meat curing, chemistry, technology and quality of cured meat. Meat sausages: Classification and technology. Meat pickling techniques and quality of meat pickle. Canning of meat and meat products.

Unit V

Composition and nutritive values of fish. Freezing, canning, dehydration and curing of fish and fish products. Fish protein concentration. Slaughter house by-products and their utilization. Processing of meat, poultry, fish and their products. Effect of processing on nutritive value of fish and fish products.

References

1. Outlines of Meat Science and Technology, B.D. Sharma, Kinshuki Sharma
2. Lawrie meat science, R.A. Lawrie, D.A. Ledward
3. The Complete Technology Book on Meat, Poultry and Fish Processing 2nd Revised Edition by NPCS Board of Consultants & Engineers

- Detect the presence of metanil yellow in turmeric powder.
- Detect the presence of sodium chloride in milk sample.
- Detect the presence of starch in the given milk sample.
- Detect the added urea in milk.
- Detection of water in milk
- Detection of detergent in milk
- Detection of starch in milk and milk product
- Detection of sugar in honey
- Detection of chalk powder in sugar
- Detection of permitted and non-permitted food colours
- Malachite green in green chilli and green vegetables.
- Artificial colour on green peas.
- Coloured dried tendrils of maize cob in saffron.
- Clay in coffee powder.
- Exhausted tea in tea leaves.
- Iron filings in tea leaves.
- Wax polishing on apple.
- Chicory powder in coffee powder.
- Demonstration of Enzyme immobilization
- Clarification of juices using enzymes
- Extraction of alkaloids from plant material
- Extraction of Oil from oil cake by soxhlet apparatus
- Estimation of curcumin in turmeric
- Estimation of iodine in Iodised salt
- Preparation of dietary fibres from food waste
- Determination of different gums and pectic substances in food materials
- Thin layer chromatography of synthetic colour
- Determination of non-permitted colours in different food materials
- To determine the threshold of taste for sweetness, sourness and saltiness.

Course Outcome:

- Students will gain the knowledge of the nature and structure of fruits and vegetables along with maturity indices, losses of perishables at different stages, changes during development, ripening and storage of fruits and vegetable.
- Students will know about the different storage techniques of perishables, traditional control of dormancy, sprouting and discolouration of perishables and regulation of ripening and control of spoilage.

Unit I

Importance of post harvest management of perishables. Nature and structure of fruits, vegetables; Nature of losses in perishables, losses at different stages. Maturity indices for harvest.

Unit II

Modified atmospheric storage, Methods of storage. Precooling, Low temperature storage, Controlled atmospheric storage, Hypobaric storage.

Unit III

Physiological changes during Development, Ripening, Storage; Impact of physiological process: Respiration and ethylene production during storage of perishables and their management.

Unit IV

Dormancy, sprouting and discoloration in perishables and its management using traditional and modern methods.

Unit V

Regulation of ripening using Chemicals, Growth regulator, Skin Coating. Control of spoilage during storage/transport of perishables, cold chain storage/transport.

References

1. Post-Harvest Handling and Processing of Fruits and Vegetables, Prof. I.S. Singh, Dr. Vinod Singh, Westville Publishing House.
2. Fruit and Vegetables, Editon: II, A.K. Thompson Blackwell Publishing.
3. Post-Harvest Technology of Perishable Horticultural Commadities Edited by Elhadi M. Yahia Woodhead Publishing
4. Post-Harvest Technologies of Fruits & Vegetables Hosahalli S. Ramaswamy P.hd, FC SBE, FAFST(I) Professor Department of Food Science and Agriculture Chemistry McGill University DEStech Publications, Inc.

Course Outcome:

- Students will be able to learn about various waste generated from Food Processing Industries and their management.
- Different physio-chemical parameter of environment and raw material required for Food Industries.
- Students will get knowledge about regulation and policies of Government about waste management.

Unit I:

Properties and requirement of processing water, water hardness, Total Dissolved Solid (TDS) and impurities, Water for Beverages.

Unit II

Properties of waste water, physical and chemical nature of impurities, Biological nature of impurities; Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD).

Unit III

Treatment of effluent form various food processing industries, Methods of primary and secondary treatments of waste water.

Unit IV

Waste solid management, waste solids upgrading and treatment, waste management from food industries.

Unit V

Issues with food waste treatment, food safety, risk and hazards, Government policies related to waste management.

References

1. Treatment & handling of waste,Bradshaw A.D., Southwood R. and Warner F; Springer
2. Food Science. Norman Potter and Joseph H. Hotchkiss; Springer
3. Solid Waste Management by Sasikumar K.Prentice Hall India Learning Private Limited
4. Foods Facts and Principles by N. Shakuntala Manay and M. Shadaksharaswamy,New Age International Private Limited
5. Water Supply, Waste Disposal and Environmental Engineering by A. K. Chatterjee, Khanna Publishers.

Course outcome:

- The course describes the principles of food preservation.
- It suggests the application of the preservation process depending on the type of food and also determine the thermal processing conditions (time / temperature) for each type of food propose a device that matches a particular conservation process.
- It chooses the appropriate application of certain conservation processes with regard to the preservation of quality and the satisfactory durability of food products.
- The course optimizes process parameters for selected conservation processes taking into account the physico-chemical properties of food products.

Unit I

Scope and importance of food processing; Heat preservation and processing: heat resistance of microorganisms, thermal death curve, types of heat treatments and effects on foods, canning of foods, cans and container types, spoilage of canned foods, heat penetration, brief concept of different heat processing, methods: blanching, roasting, frying, baking.

Unit II

Dehydration: drying, dehydration and concentration, drying curves, drying methods and type of dryers; food concentration, methods of concentration of fruit juices, liquid food concentrates, changes in food during dehydration and concentration. Water activity: role of water activity in food preservation, intermediate moisture foods (IMF), principles, characteristics, advantages and problems of IM foods.

Unit III

Refrigeration storage: requirements of refrigeration storage, changes of foods during, refrigeration storage, refrigeration load, chilling and refrigeration, cold storage. Freezing and frozen storage: freezing curves, slow and quick freezing, factors determining freezing rate, freezing methods, changes in food during freezing, frozen food storage, freeze drying in food processing

Unit IV

Emulsification in food processing: principles, examples of emulsification in food; milk, icecream mix, coffee/tea whiteners, salad dressings, meat sausages, margarine and spreads. Chemical preservation: types, uses and effects of class I and class II preservatives in foods. House hold preservation methods: pickling, salt curing, oiling and smoking, sugar addition

Unit V

Food frying: general principles, frying process; shallow frying and deep frying, frying oils, factors affecting oil uptake during frying.

References

1. Food Microbiology, 4th edition Frazier, W.C and Westhoff, D.C. Tata Mc Graw Hill Publication, New Delhi.
2. Food Science, Fifth edition Norman, N.P and Joseph, H.H., CBS Publication, New Delhi
2. Food Processing and Preservation, Sivasankar, B. Prentice Hall of India Pvt. Ltd., New Delhi.
3. Food Preservation and Processing, First edition, Kalia M. and Sangita, S. (1996). Kalyani Publishers, New Delhi.
4. Fellows, Food process technology: Principles and Technology, CRC publications.
5. Technology of Food Preservation. Desrosier & Desrosier, CBSPD Publisher
6. Food Processing and Preservation, Khetarpaul N. Dya Publishing House, New Delhi.

Course Outcome:

- Students will be able to get knowledge about different additives, their chemistry and Food uses as well as the knowledge of indirect food additives will also be gained.
- Knowledge of natural and processing generated flavours will be acquired by students along with flavour extraction techniques.
- Students will get knowledge about different devices to measure sensory parameter.
- How nutraceuticals help in preventing certain life style diseases and regulatory issues for nutraceuticals knowledge will also be gained by students.

Unit I

Food additives-definitions, classification and functions, preservatives, antioxidants, color and flavours (synthetic and natural), emulsifiers, sequestrants, humectants, hydrocolloids, sweeteners, acidulants, buffering salts, anti-caking agents - chemistry, food uses and functions in formulations; indirect food additives.

Unit II

Flavour technology: smell, taste and flavour and factors affecting. Types of flavours: natural flavours and flavours generated during processing. Extraction techniques of flavours, essential oils and oleoresins machine olfaction: A device approach for measurement of food aroma.

Unit III

Nutraceuticals- Definition, synonyms, basic of claims for compounds as nutraceutical. Proteins, starches and lipids as nutraceuticals.

Unit IV

Role of nutraceuticals in management of certain life style diseases namely diabetes, cardio vascular diseases and obesity. Regulatory issues for nutraceuticals: national and international organization.

Unit V

Preparation aspects of selected nutraceuticals such as lycopene, Flavonoids, prebiotics and probiotics. Outline of preparation and applications of dietary fiber. Introduction to functional foods. Clinical evaluation of nutraceuticals; beneficial effects and toxicity. Introduction to nutrigenomics.

References

1. Foods Facts and Principles by N. Shakuntala Manay and M. Shadaksharaswamy, New age international.
2. Food Additives and Human Health by Seyed Mohammad Nabavi, Seyed Fazel Nabavi, Monica Rosa Loizzo, Rosa Tundis, Kasi Pandima Devi and Ana Sanches Silva.
3. Food Additives by A. Larry Branen, P. Michael Davidson, Seppo Salminen and John H. Thorngate III, CRC Press
4. The Chemistry of Food Additives and Preservatives by Titus A. M. Msagati
5. Food Colours, Flavours and Additives Technology by NIIR Board of Consultants and Engineers
6. Food Science, B. Srilakshmi Editon: VII
7. Advances in Pharmaceutical Biotechnology (Eds). Patra J.K, Shukla A. C. and Das G. Springer Publication, Germany.
8. Protocols in Medicinal and Aromatic Plants. Vol.1 (Eds.) Shukla, A. C., and Dikshit Today and Tomorrow's Printer and Publishers, New Delhi, India.

FPTIN-301: Summer Training

04 Credit

Students get training of various food related techniques, safety measures, regulations etc from food industries/Institutions/R&D labs etc.

FPTIER-301: Food Toxicants and Allergens

04 Credit

Course Outcome:

- To know the definition and general principle of food toxicology, manifestation of toxic effects and safety regulation and different parameters of risk assessment.
- To know the types and origin of various types of food toxicants, toxicity of food additives
- To gain knowledge of acute and chronic toxicity,
- To acquire the information of derived toxicant from processed food and how they harm the consumers.

Unit I

Definition Scope and general principle of food toxicology, Manifestation of toxic effects, classification of food toxicants, factors affecting toxicity of compound, Methods used in safety evaluation and risk assessments.

Unit II

Toxicants and allergens in food derived from plants, animals, marine algae and mushroom, Microbial toxins, food poisoning, food borne infections and diseases. Bio transformation.

Unit III

Derived food toxicants-processing and packaging; toxicants generated during food processing such as nitrosamines, heterocyclic amines, acrylamide, benzene; persistent organic pollutants.

Unit IV

Toxicology and food additives. Toxicological aspects of nutrient supplements. Carcinogens in smoked foods. Heavy metals.

Unit V

Safety evaluation of additives: determination of acute and chronic toxicity: NOEL, ADI, LD50, GRAS status.

References

1. Introduction to Food Toxicology, Takayuki Shibamoto, Leonard F. Bjeldanes.
2. Food Toxicology: Principles and concepts, Jose M. Cocon, Marcel Dekkar Inc.
3. Food Toxicology Debasis Bagachi and Anand Swaroop Fransis and Taylor
4. Principle of Food Toxicology Tonu Pussa CRC Press
5. Handbook of Food Toxicology by S.S. Deshpande CRC Press
6. Food Toxicology by Casarett and Doull's, McGraw-Hill Education
7. Toxins in Food Waldemar M Dabrowski and Zdzislaw E Sikorshi CRC Press
8. The end of food allergy by Kari Nadeau and sloan Barnett
9. Hidden food allergies by Stephen Astor pustak mahal