

Department of Food Engineering and Technology for the

M. Tech. (Food Engg. & Tech.) Course

Syllabus for Electives

FDT 2021 - Food Standards and Safety Regulations

Topic	No. of Lectures
	30
Salient features of Food Safety & Standards Act, 2006, Structure of FSSAI, Administrative set up at the State level. Roles and Responsibilities of diff. Food safety Regulators, Food Safety Commissioner, Designated Officer, Food safety Officer, Adjudicating Officer Licensing and registration, Licenses to be granted by Central Licensing Authority, Documents/ Format required for Registration/ Licensing	05
Introduction to Food Safety, Food Contaminants (Microbial, Chemical, Physical), Food Adulteration (Common adulterants), Food Additives (functional role, safety issues), Food Packaging & labelling (Packaging types, understanding labelling rules & Regulations, Nutritional labelling, labelling requirements for pre-packaged food as per CODEX)	05
Organic food, Identifying Organic foods, Advantages, The Organic Certification Process, Organic Food labeling, GM food, Why are GM food produced, Main issues of concern for Human Health, How are GM Food regulated Internationally, Regulation in India. Role of WHO to improve evaluation of GM food, Benefits & Controversies, Irradiated Food, Labelling of Irradiated Food. Freeze dried food, Functional Foods & Nutraceuticals, Functional foods from plant sources, animal sources, dietary supplements, Regulation.	05
World Trade Organization (WTO), Principles of trading system. SPS and TBT, Differences between SPS & TBT. WTO agreement on the application of SPS measures. Food & Agriculture Organization (FAO) FAO in India, Technical Cooperation programmes, Bio-security in Food and Agriculture, World Health Organization (WHO), World Animal Health Organization (OIE), International Plant Protection Convention (IPPC) Codex Alimentarius Commission - Codex India – Role of Codex Contact point, National Codex contact point (NCCP), National Codex Committee of India – ToR, Functions, Shadow Committees etc.	05
Good Hygienic Practices (GHP), Good Manufacturing Practices (GMP), HACCP, ISO 9001 (Quality Management System), ISO 22000 (Food Safety Management System), Traceability, Food Recall	05
Need for Food analysis, Accreditation of Food Laboratory, Referral labs. Risk analysis and management in food safety, What is food	05

surveillance, Steps to be taken for reporting and dealing with food incidents. Food alerts. Offences in food, Trials (Case Study) and procedure to launch prosecution.	
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Books Recommended

1. Environmental regulation and food safety by Veena Jha.
2. Microbiological safety of food by Hobbs, 1973
3. Emerging technologies; food process by Da-wen, 2005
4. Food safety by Laura K Egenorf, 2000
5. International standards of food safety by Naomi Rees, David Watson, 2000
6. Codex alimentarius by FAO & WHO, 2007

FDT 2022 - Advances in commodity technology

Topic	No. of Lectures (30)
Genetically Modified Crops. New products and processes in various food commodities including plant and animal products.	15
Designers food, specialty foods, substitutes (eg. Milk replacers, low sodium slat, sugarless sweet meats, food for sports, geriatric). Nutraceuticals with reference to Indian Context and Ayurveda	15

Books Recommended

1. Advances in food research by G.F.Stewart, 1966
2. Functional foods: Designer foods, pharma foods and nutraceuticals by Goldberg, 1994
3. Advances in food and nutrition research by Steve L. Taylor, 2007

FDT 2052 Fundamentals of Food Biotech & Genetics

Topic	No. of Lectures (30)
Fermentative production of enzymes used in food industry; solid state fermentation; recovery of enzymes from natural sources; cheese making and whey processing, impact of enzyme technology (bioethanol, protein hydrolysates, bioactive peptides); enzymatic processing of fruit juices. Role of enzymes in baking, meat and meat processing; comparative methods of toxicity testing in (novel) foods; biosensors; enzymatic approach to tailor made fats; catabolic processes and oxygen-dependent reactions in food; use of lipases and reactions in organic solvents and two aqueous phases.	10

Chemical structure of nucleic acid proteins; introduction to Genetics DNA replication, transcription and translation; cell division, cell cycle, mitosis, meiosis; introduction to human genetics; Mendelian genetics; single cell disorders; complex traits; DNA repair mechanism; modifying enzymes; recombinant DNA technology; mutation and polymorphism and their detection; family based and case control study designs; pedigree analysis; linkage analysis and association studies.	10
PCR, RT-PCR, electrophoresis, electro blotting and capillary blotting; population & evolutionary genetics, gene mapping; microbial gene transfer mechanisms, mutation, types of mutations, molecular mechanism of mutations, practical applications; application to produce genetically modified foods	10

Books Recommended

1. Fundamentals of food biotechnology by Byong H.Lee, 1996
2. Food biotechnology by Kalidas Shetty, 2006
3. Brock Biology of microorganisms, 12th ed., by M.Madigan, J.Martinko, J.Parkar,2009
4. Principles of genetics by R. H. Tamarin, 2004
5. Fundamental bacterial genetics by Nancy Trun and Janine Trempy, 2004
6. Basic molecular and Cell Biology 3rd edition Ed. by David Latchman. 2006.

FDT 2054 - Cell Culture Technology

Topic	No. of Lectures (30)
Introduction to plant and animal tissue cultures and cell cultures in general. Cell culture lab design and equipments, Media and reagents.	05
Plant tissue culture: Concept of totipotency, differentiation and redifferentiation; callus growth patterns/ characteristics, organogenesis, hairy root culture; somaclonal variations, somatic embryogenesis, synthetic seeds, anther and pollen culture, embryo culture and significance of haploid plants; Plant tissue culture techniques for crop improvement; protoplast technology: isolation & fusion, somatic hybridization and cybrids; production of virus free plants; production of secondary metabolites indexing for plant pathogens.	15
Animal, mammalian and other cell lines for invitro testing of drugs, toxicity of environmental pollutants, production of vaccines and therapeutic proteins & production of stem cells.	5

Principles of cryobiology and molecular diagnostics, Technological aspects for commercial utilization of cell cultures: Reactor studies, scale up and biosafety.	05
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Books Recommended

1. Culture of animal cells by R. Ian Freshney
2. Animal cell culture and technology by Butler, 2004
3. Introduction to plant tissue culture by Razdan, 1998,
4. Cell culture by Yadav, Tyagi, 2005
5. Laboratory manual of plant biotechnology by Purohit S.S, 1998,
6. An introduction to Plant tissue Culture by Kalyan Kumar De. 1999

FDT 2055 - Biotechnology of Fermented Foods

Topic	No. of Lectures (30)
Functional foods, Traditional applications of food biotechnology- Fermented foods: eg dairy products, oriental fermentations, alcoholic beverages, and food ingredients; the role of biotechnology in fermented food products (dairy, meat, vegetable); Starter culture development, process development; Enzymes in the dairy industry: cheese making and whey processing, impact of enzyme technology	15
Enzymatic processing of fruit juices; Role of enzymes in baking, meat and meat processing. Applications of immunological, techniques to food industry; Detection methods for <i>E. coli</i> , <i>Staphylococci</i> , <i>Yersinia</i> , <i>Campylobacter</i> , <i>B. cereus</i> , <i>Cl. Botulinum</i> & <i>Salmonella</i> from food samples. Newer Processing Technology, Pesticide Residues, Newer Sources of Ingredients, Nutraceuticals, Use of Antibiotics & Hormones in Food Processing & Agricultural Practices etc.	15

Books Recommended

1. Industrialization of indigenous fermented foods by Keith H. Steinkraus
2. Microbiology of fermented foods by Brian J.B.Wood
3. Advances in Biochemical engineering, Vol 3 by Ghose T.K., 1974
4. Microbial technology by Peppler, 1979
5. Dairy Microbiology by E.M.Foster
6. Fermented Food Beverages in Nutrition by Gastineau CF, Darby WJ and Turner TB, 1979
7. Advances in Biotechnology by Moo-Young M, 1981

8. Fermentation Biotechnology: Principles, Processes and Products by Ward OP, 1989
9. Principles of Fermentation Technology by Stanbury PF, Whitaker A and Hall SJ, 1997

FDT 2072 - Nutritional Genomics

Topic	No. of Lectures (30)
Gene- environment interaction; gene- diet interaction; principals and practice behind dietary management of genetically transmitted disorders	10
Phenylketonuria, galactosemia; G6PD deficiency; lactose intolerance; complex traits; birth disorders; signal transduction; epigenetic mechanism	10
Bioactive components of food; nutraceutical; effective gene expression; epigenetic process; signal transduction. Recent developments in the field.	10

Books Recommended

1. Nutritional Genomics by Jim Kaput, 2006
2. Nutritional Genomics by Regina Bregelius, 2006
3. Nutrigenetics and nutrigenomics by Artemis P.Simopoulos, 2004
4. Encyclopediae of genetics, genomics, proteomics by Jorde Lynn, 2005