DISCIPLINE SPECIFIC CORE COURSE

DSE FT10: FOOD TOXICOLOGY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITE OF THE COURSE

Course Title & Code	Credit	Credit Distribution of the Course			Eligibility Criteria	
		Lecture	Tutorial	Practical	Pre-requisite of the Course (if any)	
Food Toxicology DSE FT10	4	2	0	2	XII Pass	Nil

Learning Objectives

- To understand the principles of food toxicology.
- To learn about the various toxins found in food.
- To understand the effect of toxins on human health.
- To comprehend the management of risks associated with common food toxicants and contaminants.

Learning Outcomes

- Recognise different types of food toxicants of biological origin.

- Understand the chemical contaminants introduced/ produced during food processing.
- Comprehend the principles and techniques of toxicological testing of food.
- Evaluation of food toxicity and management of related risks

SYLLABUS OF DSE FT 10

THEORY
(Credit 3; Hours 30)

UNIT I: Principles of Food Toxicology 9 Hours

In this unit students will learn the definition, scope and general principles of food toxicology; manifestation of toxic effects; classification of food toxicants; factors affecting toxicity of compounds; experimental design

- Classification of food toxicants according to source
- Factors affecting toxicity of compounds (nature, chemical structure, dose)
- Characteristics of exposure (frequency-acute and chronic, route)
- Spectrum of undesirable effects- (carcinogenicity, mutagenicity, reproductive toxicity, acute and chronic effects on metabolism)
- Definitions of LD50, TD50, NOAEL, LOAEL, ADI, TUL, ALARA, Benchmark Dose
- Basics of experimental design and evaluation of toxicity (in vitro and in vivo studies)

UNIT II: Toxins of Biological Origin 9 Hours

In this unit ,the students will be able to understand about toxicity and management of biological toxins and food allergens.

- Common plant toxins
- Microbial toxins (e.g., bacterial toxins and fungal toxins)
- Marine toxins
- Algal toxins
- Food allergens

UNIT III: Toxins of Chemical Origin 8 Hours

The students will understand adverse effects of different chemical contaminants, associated risks and their regulation.

- Environmental contaminants (pesticide residues, heavy metals, dioxins and furans; persistent organic pollutants, radionuclides, microplastics)
- Veterinary drug residues in food

UNIT IV: Toxins and Food processing 4 Hours

This unit will focus on the food toxicants which are generated during the processing at various stages

- Toxicants generated during food processing (heterocyclic amines, polycyclic aromatic hydrocarbons, acrylamides and trans fats)
- Food contact material
- Toxicity of common food adulterants, food additives and dietary supplements

PRACTICAL
(Credit 2; Hours 45)

1. Sampling for detection and quantification of toxicants in food.
2. Sample preparation and extraction of toxic substances from food samples for toxin analysis.
3. Detection of fungal toxins from food.
4. Instrumental techniques used in the analysis of toxins present in foods (HPLC, AAS and LCMS)
5. Exposure assessment of common chemical contaminants found in food.
6. Designing animal experiments to study toxicity of microbial toxins in food.
7. Antibiotic sensitivity pattern and MIC for different food pathogens.
8. Understanding a Material Safety Data Sheet and a risk assessment form.

Essential Readings

- Helferich, W., and Winter, C.K "Food Toxicology", CRC Press, LLC. Boca Raton, FL. 2007.
- Shibamoto, T., and Bjeldanes, L. "Introduction to Food Toxicology", 2009, 2ndEdition. Elsevier Inc., Burlington, MA. 3.Watson, D.H. "Natural Toxicants in Food", CRC Press, LLC. Boca Raton, FL1998.
- Mathur, P. (2018). Food Safety and Quality Control. Hyderabad: Orient BlackSwan Pvt. Ltd.
- Lawley, R., Curtis, L.and Davis,J (2012) The Food Safety Hazard Guidebook, The Royal Society of Chemistry, Cambridge, CB4 0WF, UK

Suggested Readings

- Duffus, J.H., and Worth, H.G. J. "Fundamental Toxicology", The Royal Society of Chemistry. 2006.
- Stine, K.E., and Brown, T.M. "Principles of Toxicology", 2nd Edition. CRC Press. 2006.
- Tönu, P. "Principles of Food Toxicology". CRC Press, LLC. Boca Raton, FL. 2007.
- A.W. Hayes. CRC Press, Press, New York, Principles and Methods in Toxicology. 2008.
- T. Shibamoto, L. F. Bjeldanes. Essentials of Environmental Toxicology(Third edition, 2009

Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time