

Name of the Programme: M. Sc. Zoology

Course Code: ZOO-604

Title of the Course: Toxicology (Theory)

Number of Credits: 03

Effective from AY: 2023-24

Pre-requisites for the Course:	Basic knowledge on Chemistry, Anatomy, Physiology and Ecology.	
Course Objectives:	<ol style="list-style-type: none">1. To determine the toxicity of substances, their routes of exposure and fate in the body and the environment2. To classify the different types of toxicants based on their modes of action3. To outline the significance of toxicological studies in forensic sciences	
Content:	Module 1 Introduction to toxicology: Definition and Scope, History of Toxicology, Branches of Toxicology. Classification of Toxicants (based on 1] Source, 2] Use, 3] Target organ 4] Reactivity). Toxicokinetics: Definitions and concepts of Exposure, Dose and response. Metabolism of toxicants (Phase I and Phase II reactions), Absorption, Distribution, Biotransformation and Elimination of Toxicants (Renal Elimination, Hepatic Elimination, Respiratory Elimination), Toxic actions /mechanism (Acute, Sub-chronic & Chronic). Toxicokinetic models (Descriptive and Physiological Models).	15 hours
	Module 2 Environmental Toxicity: Environmental contaminants, Dilution paradigm and Boomerang paradigm, Ways of poisoning food chain, Environmental persistence. Pollution: Air pollution, Noise pollution, water pollution and thermal pollution: types and sources, effects of pollutants on human health. Solid waste pollution: sources and effects of solid waste toxicity on human health. Pesticide and Heavy metal toxicity: effects of pesticides and heavy metals on ecosystem, mechanism of pesticides toxicity, heavy metal toxicity and their effects on human health. Zootoxins, phytotoxins and bacteriotoxins	15 hours
	Module 3	15 hours

	<p>Forensic toxicology: Disciplines of Forensic toxicology (Definition of poisons, Forensic classification of poison, factors affecting the mode of action of poisons, extraction and isolation of poisons from biological samples. Drugs included in routine post-mortem toxicology, Forensic DNA typing system. Applications of forensic toxicology</p> <p>Alkaloid toxicity: definition, classification and isolation of alkaloids from biological samples, general properties of toxic alkaloids.</p> <p>Food poisoning- definition and common sources. Analysis of food products for adulterants by physical, chemical and instrumental techniques.</p>	
Pedagogy:	Lectures/Tutorials/Videos/Assignments/Group discussion/Self-study.	
References/ Readings:	<ol style="list-style-type: none"> 1. J. Timbrell, Introduction to Toxicology, 3rd ed. Taylor and Francis Inc., 2002. 2. C. Klaassen, J. Watkins, Casarett & Doull's Essentials of Toxicology, 3rd ed. McGraw-Hill Education publication, 2015. 3. K. Stine, T.M. Brown, Principles of Toxicology. 3rd ed. CRC Press, 2015. 4. A.H. Wallace, Principles and Methods of Toxicology. 5th ed. USA: Informa Healthcare Publication, 2007. 5. T. Kwong, B. Magnani, T. Rosano, L. Shaw. The Clinical Toxicology Laboratory: Contemporary Practice of Poisoning Evaluation, 2nd ed. AACC Press, 2013. 6. G. Pandey, Y.P. Sahani. Toxicological Laboratory Manual. India: International E-Publication, 2013. 7. B. Levine, Principles of Forensic Toxicology, 2nd ed. Amer Assn for Clinical Chemistry Press, 2007. 8. E. Hodgson, A Textbook of Modern Toxicology, 4th ed. Wiley Publication, 2010. 9. M. Durrant, Handbook of Clinical Toxicology. Hayle Medical Publishers, 2019. 	
Course Outcomes:	<p>The learner will</p> <ol style="list-style-type: none"> 1. List the routes of exposure and fates of toxic substances in the body and environment 2. Categorize the sources and effects of various toxicants 3. Assess the risk of toxicants in the environment 4. Establish the importance of medico-legal aspects of toxicology 	