



बिरसा मुंडा द्रायबल युनिवर्सिटी Birsā Mūṇḍā Drāyabala Yūnīvārsīṭī

राजपिपला, जि. नर्मदा Rajpipla, Dist. Narmada

Established by Tribal Development Department, Govt. of Gujarat

School of Science B.Sc. (Zoology) Programme

Subject Code & Name: BS06MIZOO3 Introduction to Toxicology

Teaching and Evaluation Scheme:

Teaching Scheme				Examination Scheme			
Credits				Component Weightage			
				CCE		SEE	
L	T	P	Total	TH	PWE	TH	PWE
2	-	2	4	25 %	25 %	25 %	25 %

Programme Name	B.Sc. Zoology
Semester	VI
Course Code	BS06MIZOO3
Course Title	Introduction to Toxicology
Course Content Type (Th./Pr.)	Theory +Practical
Course Credit	4
Sessions + Lab. Per Week	2+4
Total Teaching/Lab. Hours	60 Hours

Learning Objectives

Students are expected to:

- Understand mechanisms of toxicity and factors influencing susceptibility.
- Apply toxicology principles to environmental and public health contexts.
- Critically evaluate fundamentals concepts and current research in toxicology.

Prerequisites (if any)

- Basic knowledge of biology, chemistry, biochemistry, physiology and laboratory safety is required for understanding toxicology.

Learning Outcomes

After successful completion of the Toxicology course, students will be able to:

- Understand the basic concepts of toxicology.
- Identify different types of toxins including natural toxins, chemical toxins, plant toxins, animal toxins,
- Understand different toxic effects such as acute, sub-acute, and chronic toxicity.
- Interpret toxicological parameters such as: LD50, LC50, IC50, EC50
- Recognize toxicants causing public health hazards
- Perform basic toxicological and cytotoxicity testing methods.
- Gain awareness about prevention and control of toxic exposure in daily life and industrial environments.



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Detailed Contents		
UNIT	TOPIC/SUB-TOPIC	TEACHING HOURS
I	• Introduction, definition, brief history, scope and sub-divisions of toxicology. • Classification of toxins, natural toxins, animal toxins, plant toxins, food toxins, Xenobiotics, Teratogens, genetic poisons and chemical toxins. • Types of toxic effects: acute toxicity, sub-acute toxicity and chronic Toxicity, LD50, LC50, IC50, EC50 • Factors affecting toxicity-Species and strain, age, sex, nutritional status, hormones, circadian rhythms and environmental factors.	15
II	• Basic concepts of Dose and dose response relationship. • Absorption, Distribution, Metabolism and Excretion (ADME) of toxins. • Portals of entry-Skin, gastro intestinal tract, and respiratory system. • Toxicants of public health hazards: Pesticides, fertilizers, automobile emission, Heavy metals. • Cytotoxicity testing methods. • Environmental Monitoring.	15
Practicals		
	List of Practical (Practical are demonstrated using charts, models and multimedia videos) 1. Identification and Classification of Natural and Chemical Toxins 2. Detection of Toxic Compounds in Plants. 3. Calculation of LD50 Using Sample Toxicity Data. 4. Simple Brine Shrimp Toxicity Assay 5. Safety Measures While Handling Toxic Chemicals 6. Study of Dose-Response Relationship Using Simulated Toxicity Data. 7. Detection of Heavy Metals in Water Samples 8. Study of Automobile Emission Pollutants 9. Effect of Pesticides on Seed Germination 10. Trypan Blue Dye Exclusion cytotoxicity Test 11. Monitoring Water Quality Parameters 12. Measurement of Particulate Matter in Air	30





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Text Book(s)

- A Textbook of Toxicology by Atul Kabra, Shivani Thakur and Ruchika Garg, PV Books
- Text Book of Toxicology by Ashish Bhalla, ISCCM
- Essentials of Toxicology, by Curtis D. Klaassen, John B. Watkins III, McGraw Hill Education (Medical), Fourth Edition, ISBN: 978-1-260-45229-7
- Introduction to Toxicology by Philip C Burcham, Springer
- Textbook of Modern Toxicology, Ernest Hodgson, Wiley

Reference Books

- Hand book of Toxicology by Derelanko, CRC Press
- Principles and methods of toxicology by Wallace A. Hayes, CRC Press, Taylor and Francis group
- Handbook of Pesticide Toxicology by Wayne J. Hayes, Edward R. Laws, Academic Press (Elsevier)
- Environmental Toxicology by Prof. Suresh Joshi and Priyanka Sharma
- Principles and Methods of Toxicology by A. Wallace Hayes; Tetyana Kobets, CRC Press / Taylor & Francis (7th ed., 2023)
- Casarett and Doull's Toxicology: The Basic Science of Poisons by Louis J. Casarett, John Doull, McGraw Hill

Web Resources

- <https://www.ncbi.nlm.nih.gov>
- <https://www.atsdr.cdc.gov>
- <https://www.who.int/health-topics/chemical-safety>
- <https://www.atsdr.cdc.gov>

L:: Lecture, **T::** Tutorial , **P::**Practical

CCE::Continuous and Comprehensive Evaluation

(CCE Theory includes Mid Semester Examination, Assignment, MCQ quizzes, Seminar, Reflective notes, class participation, case analysis and presentation, slip tests (announced/ surprised), attendance etc. or any combination of these)

PWE::Practical Work Examination

(PWE includes Laboratory practical work, project work, viva simulation exercise work etc.)

SEE::Semester End Evaluation

