FORENSIC TOXICOLOGY

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title and Code	Credits	Credit distribution of the course			Eligibility Criteria	Prerequisite of the Course (if any)
		Lecture	Tutorial	Practical/Practice		
Forensic Toxicology	2	0	-	2	XII Passed with Science	Nil

1. Learning Objectives

The Learning Objectives of this course are as follows:

- Acquire a thorough understanding of the fundamental principles of toxicology, including how toxic substances impact the human body
- Explore the role of forensic toxicology in legal cases, such as post-mortem investigations, drug-facilitated crimes, and toxin detection in criminal cases
- Develop hands-on skills in analyzing biological samples using laboratory techniques like chromatography, spectroscopy and immunoassays
- Study the ethical and legal responsibilities of forensic toxicologists, with a focus on proper evidence handling, accurate reporting, and providing testimony in court

2. Learning Outcomes

The Learning Outcomes of this course are as follows:

- Students will be able to identify various drugs, poisons, and toxins, including narcotics, hallucinogens, alcohol, and environmental toxins, and understand their effects on human health.
- Students will gain practical experience in laboratory techniques such as spectrophotometry, chromatography (TLC) and immunoassays for analyzing toxic substances in biological samples.
- Students will learn how to analyze toxicological results from biological samples and interpret their significance in forensic investigations, with an emphasis on their impact on criminal cases and legal outcomes.

3. Main Course Structure

Wherever wet lab experiments are not possible the principles and concepts can be demonstrated through any other material or medium including videos/virtual labs etc.

Unit I: Fundamental principles of forensic toxicology and its significance in criminal investigations. (6 Weeks/24 Hours)

- **Laboratory 1**: Discuss and prepare a report on the basic principles of toxicology, including ADME, DRC, toxicokinetics, and toxicodynamics
- **Laboratory 2**: Discuss the classification of drugs and controlled substances, along with testing and screening methods
- **Laboratory 3**: Learn proper techniques for collecting, storing, and preserving biological samples for toxicological analysis
- **Laboratory 4**: Participate in a virtual demonstration of post-mortem analysis related to poisoning or drug overdose cases
- **Laboratory 5**: Discuss the effects of drug poisoning on various human body systems through case studies

Unit II: Toxicological analysis of substances using common laboratory tools and techniques. (9 Weeks/36 Hours)

- **Laboratory 6**: Conduct a crime scene investigation focused on searching for toxic substances, drugs, narcotics, and psychotropic substances
- **Laboratory7:** Perform toxicological analysis of biological samples using thin-layer chromatography, including the comparison and extraction of target molecules
- **Laboratory 8**: Perform spectrophotometric analysis of biological samples and compare them with known toxic substances for quantification
- **Laboratory 9**: Explore various methods for detecting alcohol and drugs in biological fluids using colorimeter
- **Laboratory 10-11**: Analyze case studies of famous poisoning incidents, such as notable historical poisonings and criminal cases
- **Laboratory 12**: Write and present a comprehensive toxicology report based on a real or hypothetical case investigation

4. **Teaching Methodology/Activities in the Classroom**

Content presentations, virtual labs/videos, hands-on sessions and case study discussions

5. Assessment Patterns for Each Unit/Practical

Unit I:

- Written report on the principles of toxicology and the topics discussed in class (ADME, DRC, toxicokinetics, toxicodynamics). (15 marks)
- Presentation and discussion on the classification of drugs and controlled substances, testing, and screening methods. (10 marks)

Unit II:

- Case Study Analysis and Report on the effects of drug poisoning on human systems. Class discussion and active participation in the analysis (10 marks).
- Practical evaluation of search and identification techniques used during crime scene investigations. Written report on findings from the simulated investigation (15 marks).
- Practical assessment on the use of thin-layer chromatography (TLC) for analyzing biological samples. Practical test on performing spectrophotometric analysis and comparing results with known toxic substances. (15 marks)

Viva (5 marks)

Practical Record/File (10 marks)

6. Mapping with the Next Suggestive Course

Forensic Chemistry

7. Prospective Job Roles after a Particular Course

Skill enhancement increases employability and credibility, providing an edge in both private and governmental sectors. Students can enter fields like crime scene investigation, forensic chemistry and toxicology.

8. Essential Reading

- Forensic Toxicology: Medicolegal Case Studies" by D. R. (Ruth) Gurdjian (2020) CRC Press, ISBN: 978-0367330155
- Forensic Science: From the Crime Scene to the Crime Lab" by Richard Saferstein (2017) Publisher: Pearson, ISBN-13**:** 978-013429229
- Forensic Science: An Introduction to Scientific and Investigative Techniques" by Norman J. Nordby (2013) by CRC Press, ISBN-13: 978-1466515570

9. Suggestive Reading

- Forensic Toxicology: Principles and Applications" by David J. M. H. and William G. McKinney (2007) Latest Elsevier, ISBN: 978-0128103937

10. Examination scheme and mode

Evaluation scheme and mode will be as per the guidelines notified by the University of Delhi from time to time.