Forensic Chemistry

Course	**Details**			
Code				
Title	Forensic Science			
Degree	B.Sc.			
Branch	Chemistry			
Year/Semester	S3/S4			
Type	Extracurricular/Additional course			
Credits	Hrs/week		Total hours	30 h

Objectives

- To highlight the importance of Forensic science for perseverance of the society.
- To generate talented human resource, commensurating with latest requirements of forensic science
- To emphasize the importance of scientific methods in crime detection

Expected Course Outcome

Upon completion of the course the students will be able to:

- Understand the importance of Forensic science to human society
- Understand the fundamental principles and functions of Forensic Science
- Evaluate the importance of instrumental techniques in processing crime scene evidence.
- Remember the classification and characteristics of the narcotics, drugs and psychotropic substances
- Understand the forensic identification of illicit liquors, poisons, drugs etc

- **Forensic Science – Course Overview**

Sl No.	Topics	Hrs
1.	**Introduction to Forensic Science**	6
	Development and History of Forensic science. Definition and concepts in Forensic science. **Basic Principles**: Law of individuality, Principle of exchange, Law of progressive change, Principle of Comparison, Principle of Analysis, Law of probability. Scope of Forensic science**.**	
2.	**Branches of Forensic science**	6
	Introduction to Forensic biology, forensic serology, DNA profiling, Forensic Ballistics, Forensic physics, Forensic documents, Cyber forensics, Forensic psychology, Finger printing.	
3.	**Forensic Chemistry and Explosives**	10
	Narcotic Drugs and psychotropic substances: Poppy straw, Opium and its derivatives, Cannabis derivatives, Psychotropic substances listed in the NDPS Act. **Petroleum and petroleum products**: Analysis of traces of petroleum products in forensic exhibits. Comparison of petroleum products. Adulteration of petroleum products. **Cases involving Arson**: Chemistry of fire. Conditions for fire. Fire scene patterns. Analysis of fire debris. Analysis of ignitable liquid residue. Post-flashover burning. Toxicological analysis and chemical intoxication tests. **Poisons**: Classification of poisons. Physico-chemical characteristics and mode of action of poisons. Accidental, suicidal and homicidal poisonings. Signs and symptoms of common poisoning and their antidotes. **Beverages**: Alcoholic and non-alcoholic illicit liquors. Analysis and identification of ethyl alcohol. Estimation of ethyl alcohol in blood and urine. **Explosives**: Classification– low explosives and high explosives. Homemade explosives. Military explosives. Blasting agents. Blast waves. Improvised explosive devices (IED).	
4.	**Instrumental methods in Forensic science**	5
	Chromatographic methods: Forensic applications of thin layer chromatography, gas chromatography and liquid chromatography. Forensic applications of Ultraviolet-visible spectroscopy, infrared spectroscopy, atomic absorption spectroscopy, atomic emission spectroscopy and mass spectroscopy. X-ray spectrometry. Forensic applications of electrophoresis and neutron activation analysis. Forensic applications of microscopy. Forensic photography: Digital photography. Videography. Crime scene and laboratory photography.	
5.	**Organisational setup of Forensic Science laboratories and Laws**	3
	Hierarchical set up of Central Forensic Science Laboratories, State Forensic Science Laboratories, Fingerprint Bureaus, National Crime Records Bureau, Police Academies. Civil, criminal cases. Essential elements of criminal law. Constitution and hierarchy of criminal courts. Criminal Procedure Code. Cognizable and non-cognizable offences. Bailable and non-bailable offences.	

Expectations

You are expected to watch all online/offline lectures, complete the work at-home, submit weekly problem sets and worksheets.

BOOKS AND REFERENCES

1. B.B. Nanda and R.K. Tiwari, *Forensic Science in India: A Vision for the Twenty First Century*, Select Publishers, New Delhi (**2001**).
2. S.H. James and J.J. Nordby, *Forensic Science: An Introduction to Scientific and Investigative Techniques*, 2nd Edition, CRC Press, Boca Raton (**2005**).
3. E. Elaad in *Encyclopedia of Forensic Science, Volume 2*, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (**2000**).
4. J.W. Robinson, *Undergraduate Instrumental Analysis*, 5th Edition, Marcel Dekker, Inc., New York (**1995**).
5. D.R. Redsicker, *The Practical Methodology of Forensic Photography*, 2nd Edition, CRC Press, Boca Raton (**2000**).
6. F.G. Hofmann, *A Handbook on Drug and Alcohol Abuse*, 2nd Edition, Oxford University Press, New York (**1983**).
7. B.R.Sharma, *Forensic Science in Criminal Investigation and Trials*, 6th Edition, Universal, (**2020**).