KU5SECPHY102: Essential Physics for Forensic Science

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
V	DSC	100	KU5SECPHY102	3	45

Learning Approach (Hours/ Week)		Marks Distribution			Duration of ESE (Hours)
Lecture+ tutorial	Practical	CE	ESE	Total	
3	0	25	50	75	1.5

Course description:

Forensic Science is an interdisciplinary field that applies scientific principles and techniques to solve crimes and ensure justice. This course covers the analysis of physical evidence, crime scene investigation, forensic Physics, and forensic ballistics.

Course Prerequisite: NIL

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Understand the fundamental principles and significance of forensic science	*U*
2	Understanding the working of the forensic establishments in India and abroad.	*U*

3	Analyse the methods of securing, searching and documenting crime scenes, the art of collecting, packaging, and preserving different types of physical and trace evidence at crime scenes.	*An*
4	Familiarise the tools and techniques for analysis of different types of crime scene evidence. Classify firearms and understand firing mechanisms.	*U, An*

Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)

Mapping of Course Outcomes to PSOs

	PSO 1	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**	**PSO 6**	**PSO 7**
CO 1	3	2	1	1	1	1	0
CO 2	3	3	1	1	0	1	1
CO 3	3	3	3	1	2	1	1
CO 4	3	3	3	1	1	1	2
CO 5	3	2	1	3	3	2	1

Correlation level 0-None, 1-Slight, 2-Medium, 3-High

COURSE CONTENTS

Contents for Classroom Transaction:

MODULE	**UNIT**	**DESCRIPTION**	**HOURS**
1	**Introduction To Forensic Science**		**8**
	1		3

		History of Development of Forensic Science, Functions of forensic science. Definitions and concepts in forensic science, Basic Principles of Forensic Science and its Significance	
	2	Role of forensic science laboratories, Frye case and Daubert standard.	3
	3	Types of forensic Examinations, Organisational set up of Forensic Science Laboratories in India	2
		Book 2-Chapter 1,2 Book1-Chapter 1	
2	**Crime Scene Evidence**		**10**
	1	Physical Evidences Definition, Types, Class and Individual Characteristics	3
	2	Different searching methods for locating physical evidences at scene of crime, Chain of custody	3
	3	Collection, labelling and sealing of evidence, hazardous evidence	2
	4	Reconstruction of crime scene	2
		Book 2-Chapter 3	
3	**Forensic Physics**		**9**
	1	Toolmark evidence, Classification of tool marks. Forensic importance of tool marks, Collection, preservation and matching of tool marks. Restoration of erased serial numbers and engraved marks	3
	2	Glass evidence –Matching of glass samples by mechanical fit and refractive index measurements, Analysis by spectroscopic methods, Fracture analysis and direction of impact	2
	3	Paint evidence –. Analysis by destructive and non-destructive methods. Importance of paint evidence in hit and run cases	2
	4	Fibre evidence – artificial and man-made fibres. Collection of fibre evidence. Identification and comparison of fibres. Soil evidence – importance, location, collection, and comparison of soil samples.	2
		Book 2-Chapter 14,16	

4	**Forensic Ballistics**		**9**
	1	Classification of firearms, weapon types and their operation, country made firearms and regular firearms, calibre, Firing mechanisms of different firearms, Internal, external, and terminal Ballistics	3
	2	Ammunition, Types of ammunition, constructional features and characteristics of different types of cartridges and bullets, primers and priming compounds, projectiles, headstamp markings on ammunition.	3
	3	Firearm Evidence, Matching of bullets and cartridge cases in regular firearms, mechanisms of formation of gunshot residues, methods of analysis of gunshot residues from shooting hands and targets, identification and nature of firearms injuries.	3
		Book 3-Chapters 1,2, Book 4-Chapter 2,3,6	
5	**Teacher Specific Module**		**9**
	Directions:		
	Case study		

Essential Readings:

1. Forensic Science in India: A Vision for the Twenty First Century, B.B. Nanda and R.K. Tiwari, Select Publishers, New Delhi (2001).
2. Forensic Science: An Introduction to Scientific and Investigative Techniques,, S.H. James and J.J. Nordby, 4th Edition, CRC Press, Boca Raton (2005).
3. Handbook of Firearms and Ballistics, B.J. Heard, Wiley and Sons, Chichester (1997).
4. Forensic Ballistics in Criminal Justice, Kaushalendra Kumar, Eastern Book Company, 2015.

Suggested Readings:

1. A Guide to the Recovery and Collection of Physical Evidence,M. Byrd, Crime Scene Evidence: CRC Press, Boca Raton (2001).

2. Handbook of Firearms and Ballistics, B.J. Heard, Wiley and Sons, Chichester (1997).
3. Firearms identification, Forensic Science Handbook, Vol. 2,W.F. Rowe, R. Saferstein (Ed.), Prentice Hall, New Jersey (1988).
4. Role of Forensic Science in the New Millennium, M.K. Bhasin and S. Nath, University of Delhi, Delhi (2002).
5. Fisher's Techniques of Crime Scene Investigation, W.J. Tilstone, M.L. Hastrup and C. Hald, CRC Press, Boca Raton (2013).
6. E. Elaad in Encyclopedia of Forensic Science, Volume 2, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000).

Assessment Rubrics:

Evaluation Type		**Marks**
End Semester Evaluation		**50**
Continuous Evaluation		**25**
a)	*Test Paper	10
c)	**Assignment/ Book- Article Review	5
d)	Seminar/ Viva -Voce	10
Total		**75**

*Best out of two test papers

** or any other activities like quiz, open book exam, group activity