Name of the Faculty : Faculty of Science

Name of the Program : B. Sc. (H) Forensic Science [Session : 2020-21]

Scheme of Study/ Scheme of Examination

Sr. No.	Semester/ Year	Course Code	Nomenclature	Theory/ Practical	Core/ AECC/ SEC/ DSE/ GE/OE	L	T	P	Credits	Theory							Practical											Overall maximum marks	Overall Pass Marks	Whether to be offered under CBCS (Yes/No)	Scheme of Examinations (Theory+Internal +Practical +Oral/Theory +Internal+Practical/ Theory+Practical
										Summative Assessment		Formative Assessment					Summative Assessment				Formative Assessment										
										Max	Pass	Midterm	Assignment	Professional Activities	Max	Pass	Demonstration/Conduct/Presentation	Viva-voce	Max	Pass	Attendance & Regularity in Lab Work	Project/Laboratory work report	Midterm Oral Examination/Assessment	Conduct/Demonstration	Max	Pass				
			ASSIGNED MARKS							**60**	**24**	**20**	**10**	**10**	**40**	**16**	**20**	**20**	**40**	**16**	**10**	**10**	**10**	**30**	**60**	**24**	**100**	**40**		
1		17040101	Introduction to Forensic Science	Theory	Core	4	0	0	4	60	24	20	10	10	40	16												100	40	No	Theory+Internal
2		17040102	Introduction to Forensic Science Practical Lab	Practical	Core	0	0	4	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
3		17040103	Criminalistics	Theory	Core	4	0	0	4	60	24	20	10	10	40	16												100	40	No	Theory+Internal
4		17040104	Criminalistics Lab	Practical	Core	0	0	4	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
5	I / I	17040105	Physics I	Theory	GE	4	0	0	4								20	20	40	16	10	10	10	30	60	24	100	40	No	Theory+Internal
6		17040106	Physics I lab	Practical	GE	4	0	0	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
7		17040107	Zoology	Theory	GE	4	0	0	4	60	24	20	10	10	40	16												100	40	No	Theory+Internal
8		17040108	Zoology lab	Practical	GE	4	0	0	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
9		17040109	English	Theory	AECC	4	0	0	4	60	24	20	10	10	40	16												100	40	No	Theory+Internal
10		17040201	Criminal Law	Theory	Core	4	0	0	4	60	24	20	10	10	40	16												100	40	No	Theory+Internal

11	II / I	17040202	Criminal Law lab	Practical	Core	0	0	4	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
12		17040203	Forensic Psychology	Theory	Core	4	0	0	4	60	24	20	10	10	40	16											100	40	No	Theory+Internal
13		17040204	Forensic Psychology lab	Practical	Core	0	0	4	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
14		17040205	Chemistry	Theory	GE	4	0	0	4	60	24	20	10	10	40	16											100	40	No	Theory+Internal
15		17040206	Chemistry lab	Practical	GE	0	0	4	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
16		17040207	Anthropology	Theory	GE	4	0	0	4	60	24	20	10	10	40	16											100	40	No	Theory+Internal
17		17040208	Anthropology lab	Practical	GE	0	0	4	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
18		17040209	Environmental Science	Theory	AECC	4	0	0	4	60	24	20	10	10	40	16											100	40	No	Theory+Internal
19	III/ II	17040301	Forensic Dermatoglyphics	Theory	Core	4	0	0	4	60	24	20	10	10	40	16											100	40	No	Theory+Internal
20		17040302	Forensic Dermatoglyphics Lab	Practical	Core	0	0	4	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
21		17040303	Crime and Society	Theory	Core	4	0	0	4	60	24	20	10	10	40	16											100	40	No	Theory+Internal
22		17040304	Crime and Society Lab	Practical	Core	0	0	4	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
23		17040305	Technological Methods in Forensic Science	Theory	Core	4	0	0	4	60	24	20	10	10	40	16											100	40	No	Theory+Internal
24		17040306	Technological Methods in Forensic Science lab	Practical	Core	0	0	4	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
25		17040307	Computer Science	Theory	GE	2	0	0	2	60	24	20	10	10	40	16											100	40	No	Theory+Internal
26		17040308	Botany	Theory	GE	2	0	0	2	60	24	20	10	10	40	16											100	40	No	Theory+Internal
27		17040309	Handwriting Identification & Recognition	Theory	SEC	2	0	0	2	60	24	20	10	10	40	16											100	40	No	Theory+Internal
28		17040401	Forensic Chemistry	Theory	Core	4	0	0	4	60	24	20	10	10	40	16											100	40	No	Theory+Internal
29		17040402	Forensic Chemistry Lab	Practical	Core	0	0	4	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
30		17040403	Forensic Biology	Theory	Core	4	0	0	4	60	24	20	10	10	40	16											100	40	No	Theory+Internal
31		17040404	Forensic Biology lab	Practical	Core	0	0	4	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal

32	IV/ II	17040405	Questioned Document	Theory	Core	4	0	0	4	60	24	20	10	10	40	16												100	40	No	Theory+Internal
33		17040406	Questioned Document Lab	Practical	Core	0	0	4	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
34		17040407	Photography	Theory	GE	2	0	0	2	60	24	20	10	10	40	16											100	40	No	Theory+Internal
35		17040408	Biostatistics	Theory	GE	2	0	0	2	60	24	20	10	10	40	16											100	40	No	Theory+Internal
36		17040409	Introduction to Biometry	Theory	SEC	3	0	0	3	60	24	20	10	10	40	16											100	40	No	Theory+Internal
37		17040410	Summer Training	Practical		0	0	0	4								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
38	V/ III	17040501	Forensic Ballistics	Theory	Core	4	0	0	4	60	24	20	10	10	40	16											100	40	No	Theory+Internal
39		17040502	Forensic Ballistics Lab	Practical	Core	0	0	4	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
40		17040503	Forensic Toxicology	Theory	Core	4	0	0	4	60	24	20	10	10	40	16											100	40	No	Theory+Internal
41		17040504	Forensic Toxicology Lab	Practical	Core	0	0	4	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
42		17040505	Forensic Serology	Theory	DSE	4	0	0	4	60	24	20	10	10	40	16											100	40	No	Theory+Internal
43		17040506	Forensic Serology Lab	Practical	DSE	0	0	2	1								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
44		17040507	Economic Offences	Theory	DSE	4	0	0	4	60	24	20	10	10	40	16											100	40	No	Theory+Internal
45		17040508	Economic Offences Lab	Practical	DSE	0	0	2	1								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
46		17040509	Accident Investigations	Theory	DSE	4	0	0	4	60	24	20	10	10	40	16											100	40	No	Theory+Internal
47		17040510	Accident Investigations Lab	Practical	DSE	0	0	2	1								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
48		17040511	Open Elective Course	Theory	OEC	3	0	0	3	60	24	20	10	10	40	16											100	40	No	Theory+Internal
49		17040601	Forensic Anthropology	Theory	Core	4	0	0	4	60	24	20	10	10	40	16											100	40	No	Theory+Internal
50		17040602	Forensic Anthropology Lab	Practical	Core	0	0	4	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
51		17040603	Forensic Medicine	Theory	Core	4	0	0	4	60	24	20	10	10	40	16											100	40	No	Theory+Internal
52		17040604	Forensic Medicine Lab	Practical	Core	0	0	4	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal

53	VI/ III	17040605	Digital Forensics	Theory	DSE	4	0	0	4	60	24	20	10	10	40	16												100	40	No	Theory+Internal
54		17040606	Digital Forensics Lab	Practical	DSE	0	0	4	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
55		17040607	DNA Forensics	Theory	DSE	4	0	0	4	60	24	20	10	10	40	16												100	40	No	Theory+Internal
56		17040608	DNA Forensics Lab	Practical	DSE	0	0	4	2								20	20	40	16	10	10	10	30	60	24	100	40	No	Practical +Internal
57		17040609	*Project Work	Practical		0	0	6	6								40	40	80	32	20	20	20	60	120	48	200	80	No	Practical +Internal
39			**Online Courses during Semester I to VI**						**18**																				No	

***Project Work: The project work may be carried out at in-house labs or outside agencies having required facilities for the specified work. On successful completion of the project, every candidate has to submit a final dissertation/report to their concerned department.**

***4 week course- 1 credit, 8 week course- 2 credits, 12 weeks course- 3 credits**
Every semester a student may opt for either:
One, 12 week course or
One, 4 week course & One, 8 week course or
Three, 4 week courses

Department of Forensic Science
BSc (H.) (Forensic Science)
Syllabus and Curriculum (2020 onwards)
Program Structure under Choice Based Credit System (CBCS)

Semester - I

<table>
<tr><td colspan="7">1. Name of the Department: Forensic Science</td></tr>
<tr><td>2. Course Name</td><td colspan="3">Introduction to Forensic Science</td><td>L</td><td>T</td><td>P</td></tr>
<tr><td>3. Course Code</td><td colspan="3">17040101</td><td>4</td><td>0</td><td>0</td></tr>
<tr><td colspan="2">4. Type of Course (use tick mark)</td><td>Core (✓)</td><td>DSE ()</td><td>AEC ()</td><td>SEC ()</td><td>OE ()</td></tr>
<tr><td>5. Pre-requisite (if any)</td><td>10+2 with Science stream.</td><td>6. Frequency (use tick marks)</td><td>Even ()</td><td>Odd (✓)</td><td>Either Sem ()</td><td>Every Sem ()</td></tr>
<tr><td colspan="7">7. Total Number of Lectures, Tutorials, Practical</td></tr>
<tr><td colspan="2">Lectures = 52</td><td colspan="2">Tutorials = Nil</td><td colspan="3">Practical = Nil</td></tr>
<tr><td colspan="7">8. Course Description:</td></tr>
<tr><td colspan="7">In this core paper, the student will be able to know about the basic knowledge of forensic sciences, its principles, history of Forensic Science, and organizational setup in forensic science. The students will also understand about the criminal justice system.</td></tr>
<tr><td colspan="7">9. Course Objectives</td></tr>
<tr><td colspan="7">1. To develop an understanding of scope of Forensic Sciences.
2. To develop an understanding on historical development of Forensic Science, mobile forensic units and expert's testimony.
3. To develop brief knowledge about different divisions in a forensic science laboratory.
4. To understand the organizational setup of forensic laboratory in India</td></tr>
<tr><td colspan="7">10. Course Outcomes (COs):</td></tr>
<tr><td colspan="7">Upon successful completion of this course, the student will be able to:
1. Know about the basic principles and history of Forensic science in India and worldwide.
2. Understand the concept of expert witness and report writing with Indian justice system.
3. Know about the organizational set up of forensic science laboratories.
4. Understand the working and functioning of mobile forensic units.</td></tr>
<tr><td colspan="7">11. Unit wise detailed content</td></tr>
<tr><td>Unit-1</td><td colspan="2">Number of lectures = 13</td><td colspan="4">Title of the unit: History and Development of Forensic Science</td></tr>
<tr><td colspan="7">Functions of forensic science. Historical aspects of forensic science. Definitions and concepts in forensic science. Scope and need of forensic science. Basic principles of forensic science. Frye case and Daubert standard.</td></tr>
</table>

Unit – 2	Number of lectures = 13	Title of the unit: Branches of forensic Science
Branches of forensic science. Forensic science in international perspectives, including set up of INTERPOL and FBI. Roles and responsibilities of forensic scientists. Code of conduct for forensic scientists. Expert witnessing and Report writing.		
Unit – 3	**Number of lectures = 13**	**Title of the unit: Organizational set up of Forensic Science Laboratories in India I**
Hierarchical set up of Central Forensic Science Laboratories, State Forensic Science Laboratories, Government Examiners of Questioned Documents, Fingerprint Bureaus, National Crime Records Bureau,		
Unit -4	**Number of lectures = 13**	**Title of the unit: Organizational set up of Forensic Science Laboratories in India II**
Police & Detective Training Schools, Bureau of Police Research & Development, Directorate of Forensic Science and Mobile Crime Laboratories. Police Academies. Services of crime laboratories: Basic services and optional services		

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=fdxXPFKESO0
2. https://www.youtube.com/watch?v=OIjkZXfFBgI
3. https://www.youtube.com/watch?v=7NFCOH2GSRw
4. https://www.youtube.com/watch?v=a4dwypa12c4
5. https://www.youtube.com/watch?v=KE_E128mHQo
6. https://www.youtube.com/watch?v=_YjcI3nXOKA

13. Books Recommended

1. Houck, M.M. & Siegel, JA; Fundamentals of Forensic Science, Academic Press, London, 2006.
2. Sharma, B.R., Forensic Science in Criminal Investigation &Trials, Universal Publishing Co., New Delhi, 2003
3. Nanda B.B and Tiwari, R.K. Forensic Science in India- A vision for the Twenty First Century, Select publisher, Delhi, 2001.
4. James, SH and Nordby, J.J., Forensic Science- An Introduction to Scientific and investigative Techniques, CRC Press, USA (2003)
5. Saferstein; Criminalistics- An Introduction of Forensic Science, Prentice Hall Inc, USA, 2007.
6. Sharma, B.R. (1974) Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad, 1974.
7. Indian Evidence Act
8. Criminal Procedure code.

01. Name of the Department: **Forensic Science**						
02. Course Name	Introduction to Forensic Science Lab			**L**	**T**	**P**
03. Course Code	17040102			**0**	**0**	**4**
04. Type of Course (use tick mark)		Core (✓)	DSE ()	AEC ()	SEC ()	OE ()
05. Pre-requisite (if any)	10+2 with Science stream.	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
07. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical = 52**		

08 Course Description

In the core paper of forensic science laboratory, the students will learn various case studies where forensic science has been applied successfully. They will also study the organisational setup of forensic lab and other related laboratories.

09. Course Objectives

1. To study the organisational setup of forensic science lab.
2. To study the annual crime data as per NCB and CFB
3. To observe case studies pertaining to different crimes in the country.
4. To prepare comprehensive report of the crime data

10. Course Outcomes (COs):

Upon successful completion of this course, the students will able to

1. Cite examples of crime cases and study the history of crime cases from forensic science perspective
2. Study the annual reports of National Crime Records Bureau and depict the data
3. Review the Central Fingerprint Bureau coordinates and prepare reports on different types of criminal cases.
4. Learn and apply the practical knowledge of mobile forensic units.

11. Unit wise detailed content

Practicals		

1. To study the history of crime cases from a forensic science perspective.
2. To cite examples of crime cases in which apprehensions arose because of Daubert standards.
3. To review the sections of forensic science at INTERPOL and compare with those in Central Forensic Science Laboratories in India. Include suggestions for improvements if any.
4. To study the annual reports of the National Crime Records Bureau and depict the data on different types of crime cases by way of smart art/templates.

5. To write reports on different types of crime cases.
6. To review how the Central Fingerprint Bureau, New Delhi, coordinates the working of State Fingerprint Bureaus.
7. To examine the hierarchical set up of different forensic science establishments and suggest improvements.
8. To examine the list of projects undertaken by the Bureau of Police Research and Development and suggest the thrust areas of research in Police Science.
9. To compare and contrast the role of a Police Academy and a Police Training School.
10. To compare the code of conduct prescribed by different establishments for forensic scientists

12. Books Recommended

1. DFS Manuals of Forensic Science

1. Name of the Department: Forensic Sciences						
2. Course Name	Criminalistics			**L**	**T**	**P**
3. Course Code	17040103			4	0	0
4. Type of Course (use tick mark)		Core (✓)	DSE ()	GE ()	SEC ()	
5. Pre-requisite (if any)	10+2 with Science stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		

8. Course Description:

This core paper describes the basic knowledge of the crime scene management, investigation, and reconstruction. It also discusses about the documentation of crime scene and maintaining the chain of custody.

9.Course Objectives:

The course emphases on the following objectives-

1. To Develop an understanding of types of crime scenes and crime scene investigation techniques.
2. To Develop an understanding on collection and preservation of different types of physical and trace evidence.
3. To Provide the knowledge of chain of custody and its importance in legal system
4. To enumerate commonly encountered evidences at the scene of crime and various techniques used to analyse them.

10. Course Outcomes (COs):

Upon successful completion of this course, the student will be able to understand:

1. The methods of securing, searching and documenting the crime scenes.
2. The art of collecting, packaging and preserving different types of physical and trace evidence at crime scenes.
3. The legal importance of chain of custody.
4. The tools and techniques for analysis of different types of crime scene evidence.

11. Unit wise detailed content

Unit-1	**Number of lectures = 13**	**Title of the unit- Crime Scene Investigation**

Defining Crime Scene. Types of crime scenes – indoor and outdoor. Concept of primary and secondary crime scenes. Securing and isolating the crime scene, Crime Scene Protection. Crime scene search methods. Safety measures at crime scenes. Legal considerations at crime scenes. Documentation of crime scenes – photography, videography, sketching and recording notes. Duties of first responders at crime scenes. Coordination between police personnel and forensic scientists at crime scenes. The evaluation of 5Ws (who?, what?, when?, where?, why?) and 1 H (how?). Crime scene logs.

Unit – 2	Number of lectures = 13	Title of the unit- Crime Scene Evidence
Classification of crime scene evidence – physical, testimonial, and circumstantial. Locard's principle. Collection, labeling, sealing of evidence. Hazardous evidence. Preservation of evidence. Chain of custody.		
Unit – 3	**Number of lectures = 13**	**Title of the unit- Crime Scene Management & Reconstruction**
Crime Scene Management: Concept and procedure, Crime Scene Reconstruction: Procedure, steps and requirement for Reconstruction; Guidance from field notes, and documentation; Modus operandi, role of Investigating Officer.		
Unit – 4	**Number of lectures = 13**	**Title of the unit: Handling, preservation and brief analysis of common evidences**
Glass evidence – collection, packaging, analysis. Matching of glass samples by mechanical fit and refractive index measurements. Analysis by spectroscopic methods. Fracture analysis and direction of impact. Paint evidence – collection, packaging and preservation. Analysis by destructive and non-destructive methods. Importance of paint evidence in hit and run cases. Soil evidence – importance, location, collection and comparison of soil samples. Cloth evidence – importance, collection, analysis of adhering material. Matching of pieces. Tool mark 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. Forensic gemology.		

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=rl_Zsk3HjdI
2. https://www.youtube.com/watch?v=ex4FaIaOjlA
3. https://www.youtube.com/watch?v=A_CSjKrSeUY
4. https://www.youtube.com/watch?v=v5cJOWR9CP8
5. https://www.youtube.com/watch?v=FJWaUZvTXdA&t=1100s
6. https://www.youtube.com/watch?v=ccXGS5z51nQ

13. Books Recommended

1. M. Byrd, *Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence,* CRC Press, Boca Raton(2001).
2. T.J. Gardener and T.M. Anderson, *Criminal Evidence*, 4thEd., Wadsworth, Belmont (2001).
3. S.H. James and J.J. Nordby, *Forensic Science: An Introduction to Scientific and Investigative Techniques*, 2ndEdition, CRC Press, Boca Raton(2005).
4. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, *Techniques of Crime Scene Investigation*, CRC Press, Boca Raton(2010).

01. Name of the Department: Forensic Sciences						
02.Course Name	Criminalistics Lab			**L**	**T**	**P**
03. Course Code	17040104			0	0	4
04. Type of Course (use tick mark)		Core (✓)	DSE ()	AEC ()	SEC ()	OE ()
05. Pre-requisite (if any)	10 +2 with science stream	**6. Frequency (use tick marks)**	Even ()	Odd(✓)	Either Sem ()	Every Sem ()
07. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical = 52**		

08. Course Description:

This laboratory course provides an opportunity to learn the art of crime scene investigation, documentation, and reconstruction. This course also describes the analyses procedures of examination and comparison of certain evidences.

09. Course Objectives:

The objectives of this course are to:

1. Learn how to investigate and document the scene of crime.
2. Introduce Forensic Podiatry, Cheiloscopy in personal identification of suspect.
3. Describe Chain of custody in forensic science.
4. Learn how to reconstruct the crime scene.

10. Course Outcomes (COs):

Upon successful completion of this course, the students will be able to

1. Search different types of Crime Scenes.
2. Relate various evidences with crime scene and with particular crime.
3. Utilize different physical evidences such as Soil, glass, as evidence to investigate crime.
4. Understand physical matching of certain evidences.

11. List of Practicals

1. To prepare a report on evaluation of crime scene.
2. To reconstruct a crime scene (outdoor and indoor).
3. To compare soil samples by density gradient method.
4. To compare paint samples by physical matching method.
5. To compare paint samples by thin layer chromatography method.
6. To compare glass samples by refractive index method.
7. To identify and compare tool marks.
8. To compare cloth samples by physical matching.

12. Books Recommended

1. Lab Manuals Of DFSS

1. Name of the Department: Forensic Sciences						
2. Course Name	Physics I			**L**	**T**	**P**
3. Course Code	17040105			4	0	0
4. Type of Course (use tick mark)		**Core ()**	DSE ()	AEC ()	GE (✓)	OE ()
5. Pre-requisite (if any)	10+2 with Science stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		

8. Course Description:

This is a generic elective paper in forensic science. The student will be able to know about the basic knowledge of physics and its laws, basics optics and its application in our day to day life, concept of ray and wave optics as well as radioactive elements.

9. Course Objectives:

In this paper the students will be able to learn:

1. The basics principles of physics and their applications.
2. The laws and principles of lights and optics.
3. The basics of radioactive elements.
4. The concept of electromagnetism.

10. Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

1. Know about the basics of physics laws & its principles.
2. Describe the terminology and basics concept of light and optics.
3. Explain radioactive elements.
4. Describe the concept of electromagnetism.

11. Unit wise detailed content

Unit-1	**Number of lectures = 13**	**Title of the unit: Basics of Physics**

Interpretation and application of Newton's laws of motion, pseudo forces, Elastic properties of matter, elastic constants and their interrelation. Fluid dynamics, Equation of continuity, Bernoulli's equation, stream line and turbulent flow, lines of flow in air foil, Poiseuille's equation.
Introduction to ultrasonic, production of ultrasonic waves, application of ultrasonic.

Unit – 2	**Number of lectures = 13**	**Title of the unit: Light & Optics**

Concept of Ray and its limitation, Wave Nature of Light – transverse wave, interference and diffraction, Basics of Reflection, Total Internal Reflection with examples, Refraction through thin layers, thick lens, and lens combinations, Aberrations, Interference by wave front division and amplitude division, Fresnel biprism, interference in thin films, fringes in wedge shaped films, Newton's rings, simple table spectrophotometer.
Production of LASER, types of LASER, properties and application of LASER.
Optical fibers, propagation of light through optical fiber, Angle of acceptance and numerical aperture.

Unit – 3	**Number of lectures = 13**	**Title of the unit: Atomic Physics & Radioactivity**

Black body radiation, Planck's theory, De Broglie waves. Heisenberg's Uncertainty principle, Rutherford's atomic model. Bohr's atomic model of Hydrogen atom and atomic spectra.

Review of nuclear composition, nuclear properties and half-life, Radioactive decay schemes, Applications of Radio Isotopes, Radiometric dating. Nuclear detectors: Ionisation chamber and GM Counter.

Unit – 4	**Number of lectures = 13**	**Title of the unit: Electromagnetism**

Electromagnetism: Coulomb's law. Electric field, Magnetic field due to current, Gauss's theorem and its application, Ampere's law, Kirchhoff's law and their applications. Wheat-stone bridge and its sensitivity. Rectifiers, Amplifiers, semiconductor and its type of junction. Paramagnetic, diamagnetic, ferromagnetic materials and properties.

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=6dr4n0WGqow
2. https://www.youtube.com/watch?v=UJ3-Zm1wbIQ
3. https://www.youtube.com/watch?v=QlVDFZDL2Ho
4. https://www.youtube.com/watch?v=9MNsxX- xM
5. https://www.youtube.com/watch?v=quAf4eYEG28
6. https://www.youtube.com/watch?v=5LY4X4V88-0

13. Books Recommended

1. Brij Lal, N. Subramanyam, JivanSeshan. Mechanics and Electrodynamics. Chand Publishing, New Delhi, 1980.
2. D. Chattopadhyay &P.C. Rakshit. Vibrations, Waves, and Acoustics. Books & Allied (P) Ltd., 2013.
3. D. Chattopadhyay & P.C. Rakshit. Electronics: Fundamentals and Applications. New Age International, 2008.
4. Harnam Singh & P.S. Hemne. B.Sc. Practical Physics (4th ed.) S. Chand Publishing, 2011.
5. Hitendra K. Malik & A K Singh. Engineering Physics (2nd ed). Tata McGraw Hill India, 2017.
6. J.A. Buck, W.H. Hayt & M. Jaleel Akhtar. Engineering Electromagnetics (8th ed.) Tata McGraw-Hill Education, India, 2014.
7. K.L. Gomber, K.L. Gogia. Pradeep's Fundamental Physics. Pradeep Publications, 2018.
8. N.N. Bhargava, S.C. Gupta & D. C. Kulshreshtha. Basic Electronics and Linear Circuits (2nd ed). Tata McGraw-Hill Education, India, 2013.
9. P.R Sasi Kumar. Practical Physics. PHI Learning Pvt. Ltd., Delhi, 2012.
10. Satya Prakash. Engineering Physics (11th ed.). Pragti Prakashan, Delhi, 2015.

01. Name of the Department: Forensic Sciences						
02. Course Name	Physics I Lab			**L**	**T**	**P**
03. Course Code	17040106			**0**	**0**	**4**
04. Type of Course (use tick mark)		Core ()	DSE ()	AEC ()	GE (✓)	OE ()
05. Pre-requisite (if any)	10+2 with Science stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
07. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical = 52**		

08. Course Description

This laboratory course will be about the basic knowledge of physics and its laws, basics optics and its application in our day to day life, concept of ray and wave optics as well as radioactive elements.

09. Course Objectives

In this paper the students will be able to learn:

1. The basics principles of physics and their applications.
2. The laws and principles of lights and optics.
3. The basics of radioactive elements.
4. The concept of electromagnetism.

10. Course Outcomes (COs):

Upon successful completion of this course, the students will able to –

1. Understand the basics of physics applications.
2. Demonstrate the use of optical instruments.
3. Understand the working of GM counter and electronic devices such as semiconductor diode.

11. Unit wise detailed content

Practicals

1. To find the Moment of Inertia of a fly wheel about its own axis of rotation.
2. To determine the value of ‘g’ by a bar pendulum.
3. To determine to angle of a prism for sodium light using a spectrometer.
4. To determine the wavelength of monochromatic light using Newton’s Ring experiment.
5. To study double slit interference by He-Ne laser.
6. To determine the velocity of ultrasonic waves by grating formation in CC14.
7. To draw forward and reversed bias characteristics of a semiconductor diode.
8. To draw the Plateau of G.M. Counter

12. Books Recommended

1. Practical manuals of Physics

01. Name of the Department: Forensic Sciences						
02. Course Name	Zoology			**L**	**T**	**P**
03. Course Code	17040107			4	0	0
04. Type of Course (use tick mark)		Core ()	DSE ()	AEC ()	SEC ( )	GE (✓)
05. Pre-requisite (if any)	10+2 with Science Stream	**06. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
07. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		

08. Course Description

This DSE paper in Forensic Sciences, the student will be able to know about the basic knowledge of Gills, lungs, air sacs and swim bladder, Succession of kidney, Evolution of urinogenital ducts.

09. Course Objectives:

This DSE course will provide students:

1. The basic knowledge of zoology
2. The working and functions of digestive system
3. The working and function of circulatory system
4. The concept and understanding of embryonic development.

10. Course Outcomes (COs):

Upon successful completion of this course, the student will be able to understand:

1. The basics of zoological sciences.
2. Digestive System and Respiratory System
3. Circulatory System and Urinogenital System
4. Embryonic Development

11. Unit wise detailed content

Unit-1	**Number of lectures=13**	**Title of the unit: Digestive System**

Brief account of alimentary canal- structure and function of buccal cavity, oesophagus, stomach, small and large intestine and accessory organs such as liver, pancreas, gall bladder etc. Various types of digestive glands and their secretion.

Unit-2	**Number of lectures=13**	**Title of the unit: Respiratory System**

Brief introduction to respiration, Brief account of Gills, lungs, air sacs and swim bladder, Structure and functions of respiratory organs in humans, respiratory process in human, circulation of oxygen and carbon dioxide in blood.

Unit – 3	**Number of lectures=13**	**Title of the unit: Circulatory System and Urinogenital System**

Evolution of heart and aortic arches, double circulation, succession of kidney, evolution of urinogenital ducts, excretion in humans.

Unit – 4	**Number of lectures=13**	**Title of the unit: Embryonic Development**

Implantation of embryo in humans, Formation of human placenta arid functions, other types of placenta on the basis of histology; Human embryonic life cycle and its hormonal regulation. Concept of female feticide and its examination.

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=cSCfj123SfU
2. https://www.youtube.com/watch?v=iaJ53sgpa4U
3. https://www.youtube.com/watch?v=8S685ZD2Tqw
4. https://www.youtube.com/watch?v=5oKTRDV-NuY
5. https://www.youtube.com/watch?v=m_5X1A5efD0
6. https://www.youtube.com/watch?v=wAcwjWi6I9Y

13. Books Recommended

1. Kardong, K.V. Vertebrates' Comparative Anatomy, Function and Evolution. IV Edition. McGraw-Hill Higher Education. (2005)
2. Kent, G.C. and Carr R.K. Comparative Anatomy of the Vertebrates. IX Edition. The McGraw-Hill Companies. (2000)
3. Hilderbrand, M and Gaslow G.E. Analysis of Vertebrate Structure, John Wiley and Sons.
4. Walter, H.E. and Sayles, L.P; Biology of Vertebrates, Khosla Publishing House.
5. Gilbert, S. F. Developmental Biology, VIII Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA. (2006)
6. Balinsky, B.I. An introduction to Embryology, International Thomson Computer Press. (2008).
7. Carlson, Bruce M. Patten's Foundations of Embryology, McGraw Hill, Inc. (1996)

01. Name of the Department: Forensic Sciences						
02. Course Name	Zoology Lab			**L**	**T**	**P**
03. Course Code	17040108			**0**	**0**	**4**
04. Type of Course (use tick mark)		**Core ()**	DSE ()	AEC ()	GE (✓)	OE ()
05. Pre-requisite (if any)	10+2 with Science stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
07. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical =52**		

08. Course Description

In this laboratory paper of zoological sciences, the students will develop a deep knowledge of genetics, human physiology and embryonic development stages.

09. Course Objectives:

This lab course of zoology will provide students:

1. The basic knowledge and practical understanding of the zoological sciences.
2. The working and functions of digestive system
3. The working and function of circulatory system
4. The concept and understanding of embryonic development.

10. Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1. Basics of zoological sciences.
2. Examination of gametes
3. Study of developmental stages of human embryo.
4. Study of the different types of placenta- histological sections through permanent slides or photomicrographs, Examination of gametes

11. Unit wise detailed content

Practicals		

1. Osteology:
    a. Disarticulated skeleton of fowl and rabbit
    b. Carapace and plastron of turtle /tortoise
    c. Mammalian skulls: One herbivorous and one carnivorous animal.
2. Human Embryo- Study of developmental stages - whole mounts and sections through permanent slides — cleavage stages, blastula, gastrula, neurula, tail bud stage, tadpole external and internal gill stages.
3. Study of the different types of placenta- histological sections through permanent slides or photomicrographs.
4. Study of placental development in humans by ultrasound scans.
5. Examination of gametes - Human sperm and ova through permanent slides or photomicrographs.

12. Books Recommended

1. Practical Manuals of Zoology

1. Name of the Department: Forensic Sciences						
2. Course Name	English			**L**	**T**	**P**
3. Course Code	17040109			4	0	0
4.Type of Course (use tick mark)		Core ()	DSE ()	GE ()	AEC (✓)	
5. Pre-requisite (if any)	10+2 with Science stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		

8. Course Description:

In this Ability Enhancement Compulsory course, the students will be able to know about the basic knowledge of English Comprehension, Speeches with its terminologies.

9.Course Objectives (COs):

1. To learn basics of English language
2. To gain knowledge of English terminology and concept
3. To study the concept of grammar and its appropriate implications
4. To enhance writing and communication skills.

10. Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

1. Know about the English Language
2. Describe the terminology and basics concept of English Grammar.
3. Improve writing skills, note making etc.
4. Apply the concept of English language in their written and verbal communications.

11. Unit wise detailed content

Unit-1	**Number of lectures=13**	**Title of the unit: Listening Comprehension**
Speeches, Interviews, audio-video clippings followed by exercises, Introduction to Communication, Importance of Communication, Barriers to Communication and ways to overcome them		
Unit – 2	**Number of lectures=13**	**Title of the unit: Conversation skills**
Greetings and Introducing oneself, Framing questions and answers, Role play, Buying: asking details etc., Word formation strategies, Vocabulary building: Antonyms, Synonyms, Affixation, Suffixation, One word substitution		
Unit – 3	**Number of lectures=13**	**Title of the unit: Reading Comprehension**
Simple narration and Stories, Newspaper and articles clippings, Sentence types, Note Making, Paragraph Writing, Comprehension		
Unit – 4	**Number of lectures=13**	**Title of the unit: Writing Comprehension**
Report Writing: types, characteristics. Letters: types, format, style, Précis Writing, Paragraph: Order, Topic sentence, consistency, coherence, Report and Proposal, Project Writing: Features, Structure. Pronunciation, Syllable and Stress, Intonation and Modulation		

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=G_ZeBr6bhyw
2. https://www.youtube.com/watch?v=4l5RciQZxyk
3. https://www.youtube.com/watch?v=ijrMpZWUUcc
4. https://www.youtube.com/watch?v=OgNVUZvB9Ow
5. https://www.youtube.com/watch?v=OfTIrsSliLM
6. https://www.youtube.com/watch?v=LquflXdZRVo

13. Books Recommended

1. Fluency in English-II, Department of English, Delhi University, Oxford University Press.
2. Murphy's English Grammar with CD, Murphy, Cambridge University Press.
3. English Vocabulary in Use (Advanced), Michael McCarthy and Felicity, CUP.
4. Learning Spoken English by Lynn Lundquist-ASIN: B0094XNOPW.
5. Essential English Grammar: A Self-Study Reference and Practice Book for Elementary

Semester -II

1. Name of the Department: Forensic Science						
2.Course Name	Criminal Law			**L**	**T**	**P**
3. Course Code	17040201			4	0	0
4. Type of Course (use tick mark)		**Core (✓)**	DSE ()	AEC ()	SEC ()	OE ()
5. Pre-requisite (if any)	10+2 with Science stream	**6. Frequency (use tick marks)**	Even (✓)	Odd ()	Either Sem ()	Every Sem ()

7. Total Number of Lectures, Tutorials, Practicals		
Lectures = 52	**Tutorials = Nil**	**Practical = Nil**

8. Course Description:

In this core paper, the students will be able to know about the basic knowledge about IPC, CrPC and IEA related to forensic science. Acts and provisions of the Constitution of India related to forensic science and acts governing socio-economic crimes. Filing of criminal charges.

9. Course Objectives:

1. The students will be able to learn the essentials of criminal law and hierarchy of criminal courts.
2. To understand the significant sections of IPC, CrPC, and Indian Evidence Act.
3. To study the drugs and various psychotropic substances and their legal implications.
4. To understand the various acts related to wild life forensics, and environmental protection acts.

10. Course Outcomes (COs):

Upon successful completion of this course, the students will be able to

1. Understand elements of Criminal Procedure Code related to forensic science.
2. Explain Acts and provisions of the Constitution of India related to forensic science and acts governing socio-economic crimes.
3. Make use of various IPC, CrPC, and IEA sections.
4. Apply knowledge in solving crimes related to IT Act, NDPS Act, Drugs & Cosmetics Act, Dowry Prohibition act, Explosive Substances Act and Wild Life Protection Act.

11. Unit wise detailed content

Unit-1	**Number of lectures=13**	**Title of the unit: Law to Combat Crime – I**

Classification – 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.

Sentences which the court of Chief Judicial Magistrate may pass. Summary trials – Section 260(2). Judgements in abridged forms – Section 355. Section 293,294,295 in the code of criminal procedure.

Unit-2	**Number of lectures=13**	**Title of the unit: Law to Combat Crime - II**

Indian Penal Code pertaining to offences against property Sections – 378, 383, 390, 391, 405, 415, 420, 441, 463, 489A, 497, 499, 503, 511. Indian Penal Code pertaining to offences against persons – Sections 121A, 299, 300, 302, 304A, 304B, 307, 309, 319, 320, 324, 326, 351, 354, 359, 362.

Sections 375 & 377 and their amendments.

Unit – 3	**Number of lectures=13**	**Title of the unit: Constitution of India & IEA**

Preamble, Fundamental Rights, Directive Principles of State Policy. – Articles 14, 15, 20, 21, 22, 51A.Crime and media, Habitual offenders, Professional criminals, Violent offences, Recidivism.

Indian Evidence Act – Evidence and rules of relevancy in brief. Expert witness. Cross examination and re-examination of witnesses.
Sections 32, 45, 46, 47, 57, 58, 60, 73, 135, 136, 137, 138, 141.

Unit – 4	**Number of lectures=13**	**Title of the unit: Acts Pertaining to Socio-economic and Environmental Crimes**

Narcotic, Drugs and Psychotropic Substances Act. Essential Commodity Act. Drugs and Cosmetics Act. Explosive Substances Act. Arms Act. Dowry Prohibition Act. Prevention of Food Adulteration Act. Prevention of Corruption Act. Wildlife Protection Act. I.T. Act. Environment Protection Act. Untouchability Offences Act

12.Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=sv96E5Hbgf8
2. https://www.youtube.com/watch?v=I3i19qRjSSg
3. https://www.youtube.com/watch?v=nNvy7_73ecc
4. https://www.youtube.com/watch?v=MV4DAuR1O1M
5. https://epgp.inflibnet.ac.in/ahl.php?csrno=16
6. https://drive.google.com/file/d/122C9NaIYt5xamwKhiUa2X_tJCvR3x6vE/view
7. https://drive.google.com/file/d/1MY557S0fZc1Mv2GXxAY4CFi0m5Wr03gG/view
8. http://www.forensicpage.com/new13.htm
9. https://www.futurelearn.com/courses/introduction-to-forensic-science

13.Books Recommended

1. D.A. Bronstein, *Law for the Expert Witness*, CRC Press, Boca Raton (1999).
2. Vipa P. Sarthi, *Law of Evidence*, 6thEdition, Eastern Book Co., Lucknow (2006).
3. A.S. Pillia, *Criminal Law*, 6thEdition, N.M. Tripathi Pvt Ltd., Mumbai (1983).
4. R.C. Nigam, *Law of Crimes in India*, Volume I, Asia Publishing House, New Delhi (1965).
5. (Chief Justice) M. Monir, *Law of Evidence*, 6thEdition, Universal Law Publishing Co. Pvt. Ltd., New Delhi (2002).

1. Name of the Department: Forensic Sciences						
2. Course Name	Criminal Law Lab			**L**	**T**	**P**
3. Course Code	17040202			**0**	**0**	**4**
4. Type of Course (use tick mark)		Core (✓)	DSE ()	AEC ()	GE ()	OE ()
5. Pre-requisite (if any)	10+2 with Science Stream	**6. Frequency (use tick marks)**	Even (✓)	Odd ()	Either Sem ()	Every Sem ()

7. Total Number of Lectures, Tutorials, Practicals		
Lectures = Nil	**Tutorials = Nil**	**Practical =52**

8. Course Description

In this lab course , the students will be able to apply the basic knowledge about IPC, CrPC and IEA related to forensic science. They will also learn the practical aspects of the cognizable and non-cognizable offences.

9. Course Objectives

1. The students will be able to understand the differences between cognizable and non-cognizable offences.
2. To understand the roles and responsibilities of the Judicial Magistrate.
3. To study the real time cases related to rape, drugs, and firearms with their appropriate punishment implications.
4. To study various cases related to the use Explosive Substances and their investigations.

10.Course Outcomes (COs):

Upon successful completion of this course, the students will able to

1. Identify and describe the juvenile delinquency and remedial measures.
2. Understand the effects of rehabilitation of criminals and typology of crimes.

11. Unit wise detailed content

Practicals

1. To prepare a schedule of five cognizable and five non-cognizable offences.
2. To study the powers and limitations of the Court of Judicial Magistrate of First Class.
3. To study a crime case in which an accused was punished on charge of murder under Section302.
4. To study a crime case in which an accused was punished on charge of rape under Section375.
5. To cite example of a case in which the opinion of an expert was called for under Section 45 of the Indian Evidence Act.
6. To prepare a schedule of persons convicted under Narcotics, Drugs and Psychotropic Act statistically analyze the age group to which they belonged.
7. To study a case in which Drugs and Cosmetic Act was invoked.
8. To study a case in which Explosive Substances Act was invoked.
9. To study a case in which Arms Act was invoked.
10. In light of Section 304B of the Indian Penal Code, cite a case involving dowry death.

12. Books Recommended

1. Criminal law manual

1. Name of the Department: Forensic Sciences						
2. Course Name	Forensic Psychology			**L**	**T**	**P**
3. Course Code	17040203			4	0	0
4.Type of Course (use tick mark)		Core (✓)	DSE ()	GE ()	SEC ()	
5. Pre-requisite (if any)	10+2 with Science stream	**6. Frequency (use tick marks)**	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		

8. Course Description:

In this core paper of Forensic Science, the students will be able to know about the basic knowledge of Psychology, Criminal behavior Psychology and significance of criminal profiling. Ethical issues in forensic psychology. Tools for detection in cases of deception.

9. Course Objectives:

1. To understand the fundamentals of forensic psychology.
2. To differentiate between forensic psychology and forensic psychiatry.
3. To study various psychological disorders and their significances in forensic investigations.
4. To understand the applications of various detection and deception techniques used in forensic psychology.

10. Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1. Get overview of forensic psychology and its applications.
2. Explain the legal aspects of forensic psychology and the significance of criminal profiling.
3. Summarize the importance of psychological assessment in gauging criminal behaviour by tools and techniques required for detection of deception.
4. Assess the critical assessment of advanced forensic techniques like Polygraphy, narco analysis and brain electrical oscillation signatures.
5. Identify the major mental illnesses encountered in forensic psychology and apply this knowledge to case analyses.
6. Develop basic understanding of cases and laws related to forensic psychology

11. Unit wise detailed content

Unit-1	**Number of lectures=13**	**Title of the unit: Basics of Forensic Psychology**

Definition and fundamental concepts of forensic psychology and forensic psychiatry. Psychology and law. Ethical issues in forensic psychology. Assessment of mental competency. Mental disorders and forensic psychology. Psychology of evidence – eyewitness testimony, confession evidence. Criminal profiling. Psychology in the courtroom, with special reference to Section 84 and 85 of IPC.

Unit – 2	**Number of lectures=13**	**Title of the unit: Psychology and Criminal Behavior**

Psychopathology and personality disorder. Psychological assessment and its importance. Serial murderers. Psychology of terrorism. Biological factors and crime – social learning theories, psycho-social factors, abuse. Juvenile delinquency – theories of offending (social cognition, moral reasoning), Child abuse (physical, sexual, emotional), juvenile sex offenders, legal controversies.

Unit – 3	**Number of lectures=13**	**Title of the unit: Victimization**

Defining victimization, understanding the impact of various crimes on victims, Factors affecting victimization, and dealing with victimization

Unit – 4	Number of lectures=13	Title of the unit: Detection of Deception

Tools for detection of deception – interviews, non-verbal detection, statement analysis, voice stress analyzer (VSA), Hypnosis. Polygraphy – operational and question formulation techniques, ethical and legal aspects, the guilty knowledge test. Narco analysis and brain electrical oscillation signature (BEOS) – principle and theory, ethical and legal issues.

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=HMPIvOUvqPA
2. https://www.youtube.com/watch?v=z_4tvjT-Q88
3. https://www.youtube.com/watch?v=t3yzPbeBXGQ
4. https://www.youtube.com/watch?v=wYTmbpaiYYU
5. https://www.youtube.com/watch?v=tpJcBozuF6A
6. https://www.youtube.com/watch?v=XDkVnHG6WDQ

13. Books Recommended

1. AldertVrij. Detecting Lies and Deceit: Pitfalls and Opportunities (2nd ed). Wiley, 2008.Brent Turvey. Criminal profiling: An Introduction to Behavioral Evidence Analysis. Academic Press, 2011.
2. C.R. Mukundan. Brain Experience: Neuroexperiential Perspectives of Brain-Mind. Atlantic Publishers & Distributors (P) Ltd., 2007.
3. David A. Crighton & Graham J. Towl. Forensic Psychology (2nd ed).. Wiley, 2015.
4. Irving B. Weiner & Randy K. Otto. The Handbook of Forensic Psychology (4th ed). Wiley, 2010.
5. Murray Kleiner. Handbook of Polygraph testing (1st ed). Academic Press, 2001.
6. Nathan J. Gordon. Essentials of Polygraph and Polygraph testing (1st ed). CRC Press, 2016.
7. Sandie Taylor. Forensic Psychology-The Basics. Routledge, 2015
8. William O'Donohue & Eric Levensky. Handbook of Forensic Psychology (1st ed). Academic Press, 2003.

1. Name of the Department: Forensic Sciences						
2. Course Name	Forensic Psychology Lab			**L**	**T**	**P**
3. Course Code	17040204			**0**	**0**	**4**
4. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**AEC ()**	**GE ()**	**OE ()**
5. Pre-requisite (if any)	10 +2 with Science stream	**6. Frequency (use tick marks)**	Even(✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical =52**		

8.Course Description:

In this particular lab course, the students will be able apply the knowledge of forensic psychology in criminal investigation. They will also get an experience to prepare the case reports pertaining to association tests, thematic appreciation test, and performance of intelligence test.

9. Course Objectives:

1. To understand the relationship between mental disorders and Forensic Psychology.
2. To apply the knowledge in preparation of the case reports related to thematic appreciation test.
3. To learn about the Bhatia's battery of performance test of intelligence.
4. To understand the applications of polygraphs and brain mapping in the aspects of criminal investigation.

10. Course Outcomes (COs): Upon successful completion of this course, the students will able to

1. Identify and perform the Forensic psychological Test
2. **U**nderstand the different types of the psychological test such as Polygraph, Brain mapping etc.
3. To differentiate between true insanity and fake insanity
4. Application of psychology in forensic cases.

11. Unit wise detailed content

Practicals

1. To cite a crime case where legal procedures pertaining to psychic behavior had to be invoked.
2. To prepare a report on relationship between mental disorders and forensic psychology.
3. To review a crime case involving serial murders. Comment on the psychological traits of the accused.
4. To cite a crime case involving a juvenile and argue for and against lowering the age for categorizing an individual as juvenile.
5. To study a criminal case in which hypnosis was used as a means to detect deception.
6. To prepare a case report on thematic appreciation test.
7. To prepare a case report on Minnesota multiphasic personality inventory test.
8. To prepare a case report on word association test.
9. To prepare a case report on Bhatia's battery of performance test of intelligence.
10. To cite a criminal case in which narco analysis was used as a means to detect deception.

12. Books Recommended

1. DFSS manual

1. Name of the Department: Forensic Sciences						
2. Course Name	Chemistry			**L**	**T**	**P**
3. Course Code	17040205			4	0	0
4.Type of Course (use tick mark)		Core ()	DSE ()	GE (✓)	SEC ()	
5. Pre-requisite (if any)	10 +2 with Science stream	**6. Frequency (use tick marks)**	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		

8. Course Description:

This is Generic Elective paper in Forensic Sciences, the student will be able to know about the basic knowledge of Chemistry, its concepts and terminologies.

9. Course Objectives:

1. The students will be able to learn the basics and concept of the chemistry.
2. To understand the concept of chemical kinetics and electro-chemistry.
3. To learn the IUPAC nomenclature of aliphatic and aromatic compounds.
4. To understand the modern periodic table along with S and P block elements.

10. Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

1. Know about the basics of Inorganic and Organic Chemistry & Techniques.
2. Describe the Chemical Compounds & Physical Chemistry.
3. Gain the knowledge in field of Inorganic Chemistry & Physical Analytics.
4. Determine the IUPAC nomenclature of aliphatic and aromatic compounds

11. Unit wise detailed content

Unit-1	**Number of lectures=13**	**Title of the unit: Concept of Chemistry**

Dalton's atomic theory: concept of elements, atoms and molecules. Atomic and molecular masses. Mole concept and molar mass: percentage composition, empirical and molecular formula. Structure of atom, isotopes and isobars. Different Atomic models and their limitations.

Unit-2	**Number of lectures=13**	**Title of the unit: Introduction Of Inorganic And Organic Chemistry & Techniques**

Empirical and molecular formulae, hybridization, nature of chemical bonding, polarization, hydrogen bonding, Van der walls forces, IUPAC nomenclature of alkanes, alkenes, haloalkanes, alcohol, ether, aldehydes, ketones, carboxylic acids, nitro compounds, nitrites including cyclic analogues and also aromatic compounds, naphthalene, anthrones and phenanthrones. Reactive intermediates and related reactions. Introduction of Gravimetric analysis and Volumetric analysis Chromatographic separation, liquid chromatography (paper, column and TLC).

Unit – 3	**Number of lectures=13**	**Title of the unit: Introduction Of Chemical Compound & Physical Chemistry**

Heterocyclic Chemistry: Natural products, Petroleum products, insecticides, pesticides etc. Introduction to dyes, Paints, polymers.

Chemical thermodynamics- Gibbs- Helmholtz's energy efficiency, entropy, work function.

a) Chemical kinetics –rate, order and molecularity of reaction. Energy of activation, molecular activation-collision theory, Specific reaction rate-half-life expression.

b) Electro chemistry: Laws of electrochemistry, Electro chemical cell, salt bridge, EMF-set up of cell –callus. Conductance, Conductometry, Electro Motive Force, Potentiometry

Unit – 4	**Number of lectures=13**	**Title of the unit: Inorganic Chemistry & Physical Analytical**

Chemical thermodynamics and kinetics, first law of thermodynamics, internal energy, enthalpy, second law of thermodynamics, entropy and its significance, free energy and work function. Rate of reaction, order of molecularity of reaction, slow reaction and fast reaction, first order reaction, half-life period of first order reaction, activation energy, temperature dependence of activation energy, explosive reactions, oscillatory reactions.

Study of Modern Periodic Table, Long form of Periodic Table, periodic properties, atomic radiation, ionization potential, electron affinity, electro negativity, metallic characters, Non- metallic characters and magnetic properties, Comparative study of S and P block elements

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=csZ3ImMoZ0U
2. https://www.youtube.com/watch?v=Ez2EaGNt-u8&list=PLF_7kfnwLFCHlh8wdeQ_ZZ96DhBDjqGMZ
3. https://www.youtube.com/watch?v=j7PYqR1iGMg&list=PLF_7kfnwLFCF_VxKKAhHSLryCsJr3GW71
4. https://www.youtube.com/watch?v=uHWtNyKmbWA&list=PLm8ZSArAXicJAzGE7ebwSOiFN-f9xEOKu
5. https://www.youtube.com/watch?v=SuvyYXLyi_E
6. https://www.youtube.com/watch?v=bKKJkxqIg94

13. Books Recommended

1. Arun Bahl, B.S. Bahl& G.D. Tuli. Essential of Physical Chemistry. S. Chand Publishing, New Delhi, 2014.
2. Bhupinder Mehta & Manju Mehta. Organic Chemistry (2nd ed.), PHI Learning, 2015.
3. H.C. Khera. Inorganic Chemistry –I (4th ed.) Pragati Prakashan Meerut, 2017.
4. J.D. Lee. Concise Inorganic Chemistry (5th ed.) Oxford University Press
5. J.N Gurtu&AGurtu. Advanced Physical Chemistry Books. Pragati Prakashan Meerut.
6. L Finar. Organic Chemistry, Vol. 1 (6th Ed.) Pearson, 1973
7. R.L Madan. Chemistry for Degree Students (B.Sc. 1st Year). S. Chand Publishing, New Delhi, 2011.
8. V.K. Ahluwalia, Sunita Dhingra & Adarsh Gulati. College Practical Chemistry. Universities Press, 2005.

1. Name of the Department: Forensic Sciences						
2. Course Name	Chemistry Lab			**L**	**T**	**P**
3. Course Code	17040206			**0**	**0**	**4**
4. Type of Course (use tick mark)		Core ( )	DSE ( )	AEC ( )	GE (✓)	OE ( )
5. Pre-requisite (if any)	10+ 2 with Science Stream	**6. Frequency (use tick marks)**	Even(✓)	Odd ()	Either Sem ( )	Every Sem ( )
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical =52**		

8. Course Description:

In this particular laboratory course of chemistry, the students will get a knowledge pertaining to the fundamentals and concepts of chemistry, various types of lab apparatus, instruments, and properties of common chemical compounds.

9. Course Objectives:

1. The students will be able to determine the density and viscosity of various liquids.
2. The students will understand the concept of qualitative analysis of different organic compounds.
3. To learn about the preliminary and confirmatory examination chemical compounds.
4. To standardize the chemical compounds in their given liquid forms.

10. Course Outcomes (COs):

Upon successful completion of this course, the students will able to –

1. Identify the given salt/ chemical and perform the Preliminary test followed by confirmatory Test
2. Understand the different types of Chemical compounds, nature and their property by test.
3. Gain the knowledge in field of Inorganic Chemistry & Physical Analytics.
4. Determine the IUPAC nomenclature of aliphatic and aromatic compounds

11. Unit wise detailed content

Practicals

1. Introduction to Chemistry laboratory apparatus and instruments.
2. To determine the density of given liquid.
3. To determine the viscosity of given liquid.
4. To determine the surface tension of given liquid.
5. Standardization of given liquid by primary standard.
6. To determine strength of given acid.
7. Inorganic micro / semi micro qualitative analysis.
8. Identification of organic compound by qualitative analysis.
9. Determination of organic functional groups.

12. Books Recommended

1. Practical Manuals of Chemistry

1. Name of the Department: Forensic Sciences						
2.Course Name	Anthropology			**L**	**T**	**P**
3. Course Code	17040207			4	0	0
4.Type of Course (use tick mark)		Core ()	DSE ()	GE (✓)	SEC ()	
5. Pre-requisite (if any)	10+ 2 with Science Stream	**6. Frequency (use tick marks)**	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		

8. Course Description:

This is Generic Elective paper in Forensic Sciences, the student will be able to know about the basic knowledge of Anthropology, its concepts and its terminologies.

9. Course Objectives:

1. To learn various theories of human evolution and paleo-anthropology
2. The students will be able to learn and understand the history of tribal administration.
3. The students will understand the concept of forensic anthropology and its application in the field of individualization in respect to age, race, and sex through the skeletal remains.
4. To understand the use of genetic polymorphism and biomarkers in human identification.

10. Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1. Know about the basics of Anthropology Subject.
2. Describe the terminology and basics concept of Anthropology.
3. Improve knowledge about Evolution.
4. Develop the understanding of forensic facial reconstruction and its utilization in personal identification

11. Unit wise detailed content

Unit-1	**Number of lectures =13**	**Title of the unit: Theories of evolution, and Paleo-anthropology**

Theories of evolution. Human variation and evolution. Theories of evolution. Lamarckism, Neo Lamarckism, Darwinism, Synthetic theory, Mutation and Neo-Mutation theory.
Methods of Estimation of Time and Reconstruction of the Past, Absolute dating methods, Relative dating methods of climatic reconstruction: palynology, paleontology, Primate origins and radiation with special reference to Miocene hominoids: Ramapithecus, distribution, features and their phylogenetic relationships.

Unit – 2	**Number of lectures =13**	**Title of the unit: Biological Diversity in Human Populations-I**

Tribes and Wider world. The history of tribal administration; Constitutional safeguards. Draft National Tribal Policy, Issues of acculturation assimilation and integration. Impact of development schemes and programme on tribal life.

Unit – 3	**Number of lectures =13**	**Title of the unit: Biological variability**

Concept of Biological Variability; Race; Hardy-Weinberg Law; Sources of Genetic Variation; Structuring Genetic Variation; Interpretation of Human Variation, Genetic Polymorphism (Serological, Biochemical and DNA Markers); Human Adaptability -Adaptive Mechanisms determining the types of

adaptation. Hardy-Weinberg principle Genotypic and allelic frequencies, assumptions of Hardy-Weinberg equilibrium.

Unit – 4	**Number of lectures =13**	**Title of the unit: Forensic Anthropology**

Introduction to Forensic Anthropology: Definition, Scope, Applications and Integration of Forensic Anthropology, brief review of Big four-age, sex, stature and race.

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=-zsS-SRsuxo
2. https://www.youtube.com/watch?v=RRHsUdKzQ0c
3. https://www.youtube.com/watch?v=7S4WMwesMts
4. https://www.youtube.com/watch?v=jUHokSPkzT8
5. https://www.youtube.com/watch?v=MyM4YRty6JE
6. https://www.youtube.com/watch?v=-t_DB9kWTbo

13. Books Recommended

1. Nicholas D. Castes of Mind: Colonialism and the Making of Modern India. Princeton University Press. (2001).
2. Bernard CS. India: The Social Anthropology of Civilization. Delhi: Oxford University Press. (2000)
3. Bhasin MK, Watter H and Danker-Hopfe H. People of India - An Investigation of Biological variability in Ecological, Ethno-economic and Linguistic Groups. Kamla Raj Enterprises, Delhi, (1994)
4. Crawford MH. Anthropological Genetics Theory, Methods and Applications. Cambridge University Press, (2007)
5. Cummings M.R. Human Heredity: Principles and Issues. Ninth Edition. Brooks/Cole, Cengage Learning, (2011).
6. Frisancho R. Human Adaptation and Accommodation. University of Michigan press, (1993)
7. Harrison G.A., Tanner, J.M., Pilbeam, D.R., Baker, P.T. Human Biology. Oxford University Press, (1988)
8. Vidyarthi L.P. and Rai B.K. Tribal Culture in India, New Delhi, Concept Publishing Company. (1985)
9. Bhattacharya D.K. Emergence of Culture in Europe, Delhi, B.R. Publication. (1978).
10. Bhattacharya D.K. Old Stone Age Tools and Techniques. Calcutta, K.P. Bagchi Company, (1979)
11. Bhattacharya D.K. Palaeolithic Europe. Netherlands, Humanities Press. (1996)
12. Jurmain R., Kilgore L., Trevathan W., Ciochon R.L. Introduction to Physical Anthropology. Wadsworth Publ., USA. (2012)
13. Krober A. L. Anthropology. Oxford & IBH Publishing Co., New Delhi. (1948)
14. Stanford C., Allen J.S. and Anton S.C. Exploring Biological Anthropology. The Essentials. Prentice Hall Publ, USA. (2013)

1. Name of the Department: Forensic Sciences						
2. Course Name	Anthropology Lab			**L**	**T**	**P**
3. Course Code	17040208			**0**	**0**	**4**
4. Type of Course (use tick mark)		Core ()	DSE ()	AEC ()	GE (✓)	OE ()
5. Pre-requisite (if any)	10+ 2 with Science Stream	**6. Frequency (use tick marks)**	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical =52**		

8. Course Description:

In the laboratory course of Anthropology, the student will be able to apply their basic knowledge and understanding of Anthropology, its concepts and its terminologies practically.

9. Course Objectives:

1. The students will be able to learn the theory of human evolution.
2. To understand the basics of Somatometry and its application for forensic purposes.
3. To gain the practical knowledge blood typing and its significance in forensic work.
4. To interpret the knowledge of somatoscopy in respect to various human traits.

10. Course Outcomes (COs):

1. Students would be able to know about the basics of Anthropology Subject.
2. Students would be able to describe the terminology and basics concept of Anthropology.
3. They would gain the knowledge about Evolution.
4. Student would be able to apply the concept of somatometry and somatoscopy.

11. Unit wise detailed content

Practicals

1. To Study about the Somatometry 1. Maximum head length 2. Maximum head breadth 3. Minimum frontal breadth 4. Maximum zygomatic breadth 5. Bigonial breadth 6. Nasal height 7. Nasal length 8. Nasal breadth 9. Physiognomic facial height 10. Morphological facial height 11. Physiognomic upper facial height 12. Morphological upper facial height 10. Head circumference 14. Stature 15. Sitting height 16. Body weight
2. Somatoscopy 1. Head form 2. Hair form 3. Facial form 4. Eye form 5. Nose form 6. Hair colour 7. Eye colour 8. Skin colour
3. To study about the Osteometry: Measurements of long bones: lengths, minimum/least circumference and caliber index
4. Identification of casts of fossils of family hominidae: Drawing and comparison of characteristics.
5. Blood group typing
6. To study the concept and hereditary of Color Blindness
7. Glucose-6-phosphate dehydrogenase deficiency (G6PD)
8. PTC tasting ability

12. Books Recommended

1. Practical Manuals of Anthropology

1. Name of the Department: Forensic Sciences						
2. Course Name	Environmental Science			**L**	**T**	**P**
3. Course Code	17040209			4	0	0
5. Type of Course (use tick mark)		Core ( )	DSE ()	GE(✓)	SEC ( )	
5. Pre-requisite (if any)	10+ 2 with Science Stream	**6. Frequency** (use tick marks)	Even (✓)	Odd ( )	Either Sem ( )	Every Sem ( )
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		
8. Course Description:						
This course study of environmental problems is inherently interdisciplinary, blending perspectives from the sciences, social sciences, and humanities. .						
9. Course Objectives:						
1. To learn the Organizational level of ecological systems 2. To understand the scope of environmental sciences in the current scenario. 3. To gain the knowledge and impact of various types of pollutions along with their preventive measures. 4. To understand the different environmental issues and there social impact.						
10. Course Outcomes (COs):						
Upon successful completion of this course, the students will be able to: 1. Know the Importance of environmental studies and methods of conservation of natural resources.. 2. Describe the structure and function of an ecosystem and explain the values and Conservation of bio-diversity. 3. Recall social issues and legal provision and describe the necessities for environmental act 4. To describe the impact of various pollutants in society and the parameters to overcome these pollutants.						
11. Unit wise detailed content						
Unit-1	**Number of lectures=13**	**Title of the unit:-** The Multidisciplinary nature of environmental studies.				
The Multidisciplinary nature of environmental studies, Definition, scope and importance. Need for public awareness. Natural Resources, Renewable and non-renewable resources: Natural resources and associated problems. Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.						
Unit – 2	**Number of lectures=13**	**Title of the unit:-** Ecosystems				

Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Biodiversity and its conservation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit – 3	**Number of lectures=13**	**Title of the unit:** Environmental Pollution

Definition, causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Fireworks, their impacts and hazards. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

Unit – 4	**Number of lectures=13**	**Title of the unit:** Social Issues and the Environment

Unsustainable to Sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Consumerism and waste products. Environmental Legislation (Acts and Laws) Issues involved in enforcement of environmental legislation. Human Population and the Environment. Population growth, variation among nations with case studies, Population explosion – Family Welfare Programmes and Family Planning Programmes, Human Rights, Value Education, Women and Child Welfare

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=9TmZRZ-w1Y4
2. https://www.youtube.com/watch?v=YaRkQ6mYNC4
3. https://www.youtube.com/watch?v=bCVtowxwqR8
4. https://www.youtube.com/watch?v=v-RMhW4Xcyw
5. https://www.youtube.com/watch?v=InD80_yGLR0
6. https://www.youtube.com/watch?v=QzP2mnrVdeY

13. Books Recommended

1. Dhameja, S. K., Environmental Engineering and Management, S. K. Kataria and sons, New Delhi, 1st Edition2015.
2. Anubha Kaushik and Kaushik C.P., Environmental Science & Engineering" New Age international Publishers, New Delhi, 2010.
3. Gilbert M. Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., 2nd edition, 2004.
4. Erach Bharucha, Textbook for Environmental Studies, UGC, New Delhi, 2004.
5. Miller T.G. Jr., "Environmental Science", Wadsworth Publishing Co. USA, 2nd Edition2004.
6. Erach Bharucha, "The Biodiversity of India", Mapin publishing Pvt. Ltd., Ahmedabad India, 2002.
7. Trivedi R.K., "Handbook of Environmental Laws", Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro media, 2003.
8. Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001. 7. Wager K.D., "Environmental Management", W.B. Saunders Co., Philadelphia, USA, 1998.
9. Sawyer C. N, McCarty P. L, and Parkin G. F., Chemistry for Environmental Engineering, McGraw-Hill, Inc., New York, 1994.

Semester-III

1. Name of the Department: Forensic Sciences						
2. Course Name	Forensic Dermatoglyphics			**L**	**T**	**P**
3. Course Code	17040301			4	0	0
4.Type of Course (use tick mark)		Core (✓)	DSE ()	GE ()	SEC ()	
5. Pre-requisite (if any)	10 +2 with science Stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		

8. Course Description:

In this core paper of forensic sciences, the student will be able to know about the basic knowledge of fingerprints, types, its examination by developing the latent prints and significance in crime scene investigation.

9. Course objectives:

1. To learn about the basics of fingerprints
2. To understand the different classification systems in fingerprint
3. To understand the different methods and techniques of developing fingerprints on various surfaces at crime scene
4. To learn about different types of prints/impressions and their comparisons
5. To learn the report writing on crime scene impressions.

10. Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

1. Different instrumental techniques that use in fingerprint examinations.
2. Understand the Individual identification from fingerprint and they can use in the crime investigation.
3. Know the Significance of foot, palm, ear and lip prints.
4. Develop latent fingerprints on crime scene.

11. Unit wise detailed content:

Unit-1	**Number of lectures=13**	**Title of the unit- Basics of Fingerprinting**

Introduction and history, Biological basis of fingerprints. Formation of ridges. Fundamental principles of fingerprinting. Types of fingerprints. Fingerprint patterns. Fingerprint characters/minutiae. Plain and rolled fingerprints. Classification and cataloguing of fingerprint record. Automated Fingerprint Identification System. Significance of poroscopy and edgeoscopy.

Unit – 2	**Number of lectures=13**	**Title of the unit- Development of Fingerprints**

Fingerprints at crime scene: Latent, patent and plastic prints, Constituents of sweat residue. Latent fingerprints' detection by physical and chemical techniques. Mechanism of detection of fingerprints by different developing reagents. Application of light sources in fingerprint detection. Preservation of developed fingerprints. Digital imaging for fingerprint enhancement. Fingerprinting the deceased. Developing fingerprints on gloves.

Unit – 3	**Number of lectures=13**	**Title of the unit: Other Impressions/ Prints**

Importance of footprints. Casting of foot prints, Electrostatic lifting of latent foot prints. Palm prints. Lip prints - Nature, location, collection and examination of lip prints. Ear prints and their significance.

Unit – 4	Number of lectures=13	Title of the unit: comparison of prints and report writing
Comparison of fingerprints, footprints, footwear and other impression evidences. Report writing and expert witnessing.fiif		

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=0piLHJkjLAQ
2. https://www.youtube.com/watch?v=fMLGROOcvWQ&t=50s
3. https://www.youtube.com/watch?v=InPyy5tpBLM
4. https://www.youtube.com/watch?v=OONfQcGd-uE
5. https://www.youtube.com/watch?v=BUhyV3WC6y8
6. https://www.youtube.com/watch?v=ARdEifU_KVg

13. Books Recommended

1. Bridges, B.C; Criminal Investigation, Practical Fingerprinting, Thumb Impression, Handwriting expert Testimony, Opinion Evidence., Univ. Book Agency, Allhabad,2000
2. Mehta, M.K; Identification of Thumb impression & cross examination of Fingerprints,
3. N.M. Tripathi Pub. Bombay, 1980.
4. Chatterjee, S.K; Speculation in Fingerprint Identification, Jantralekha printing Works, Kolkata, 1981.
5. Cowger James F; Friction Ridge Skin- Comparison & Identification of Fingerprints, CRC Press, NY, 1993
6. Cossidy, M.J; Footwear Identification, Royal Canadian, Mounted Police, 1980.
7. Iannavelli, A.V; Ear Identification, Forensic Identification Series, Paramount,1989.
8. Henry, C.L. &Ganesslen, R.E; Advances in Fingerprint Technology, CRC Press, London,1991.
9. Jain, A.K., Flynn, P.& Ross A.A., Handbook of Biometrics, Springer, New York 2008

1. Name of the Department: Forensic Sciences						
2. Course Name	**Forensic Dermatoglyphics Lab**			**L**	**T**	**P**
3. Course Code	**17040302**			0	0	4
4. Type of Course (use tick mark)		Core (✓)	DSE ()	AEC ()	SEC ()	OE ()
5. Pre-requisite (if any)	10 +2 with Science stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 00		**Tutorials = 00**		**Practical = 52**		

8.Course Description:

In this laboratory course students will be able to apply knowledge of fingerprinting to develop fingerprints from various surface using different techniques and preparing cast to develop other impressions

9.Course Objectives:

1. To learn about recording of fingerprints
2. To understand the different types of fingerprints and their classification
3. To develop fingerprints from various surfaces
4. To understand the development of footprints

10. Course Outcomes (COs):

Upon successful completion of this course, the students will be able to

1. Take and classify fingerprints.
2. Compare fingerprints.
3. Utilize different developing methods of latent/chance prints.
4. Understand poroscopy.

11. Practical

1. To record plain and rolled fingerprints.
2. To carry out ten-67Yyyyyybdigit classification of fingerprints.
3. To identify different fingerprint patterns.
4. To identify core and delta.
5. To carry out ridge tracing and ridge counting
6. To investigate physical methods of fingerprint detection.
7. To investigate chemical methods of fingerprint detection.
8. To use different light sources for enhancing developed fingerprints.
9. To prepare cast of footprints.

12. Books Recommended

1. Lab Manuals Of DFSS

1. Name of the Department: Forensic Sciences						
2. Course Name	Crime & Society			**L**	**T**	**P**
3. Course Code	17040303			4	0	0
4. Type of Course (use tick mark)		Core (✓)	DSE ()	AEC ()	SEC ()	OE ()
5. Pre-requisite (if any)	10+2 with Science stream.	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		

8. Course Description:

In this core paper the student will be able to know about the basics of criminology, crime in society, victimology and criminal justice system.

9.**Course Objectives:**

1. To learn about the basics of criminology
2. To understand the different theories of criminal behaviour.
3. To learn about the different types of crimes in society
4. To understand the victimology and CJS

10. Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1. Know about the cause and importance of Criminology and Criminal Behaviour.
2. Know the significance of criminal profiling to mitigate crime.
3. Know the consequences of crime in society.
4. Understand the elements of criminal justice system.

11. Unit wise detailed content

Unit-1	**Number of lectures = 13**	**Title of the unit: Basics of Criminology**

Basics of Criminology- Definition, aims and scope. Theories of criminal behavior – classical, positivist, sociological. Criminal anthropology. Criminal profiling. Understanding modus operandi. Investigative strategy. Role of media.

Unit – 2	**Number of lectures = 13**	**Title of the unit: Crime in society**

Crime- Introduction to crime, Sociological aspect in society, Criminal behavior, Types of crime, Monitoring system in society, Crime scenario in India, Elements, nature, causes and consequences of crime. Deviant behavior. Hate crimes, organized crimes and public disorder, domestic violence and workplace violence. White collar crimes, crime against women and children, Terrorism

Unit -3	**Number of lectures = 13**	**Title of the unit: Victimology**

Definition and concept of victimology. Juvenile delinquency. Social change and crime. Psychological Disorders and Criminality. Situational crime prevention. Case studies

Unit – 4	**Number of lectures = 13**	**Title of the unit: Criminal Justice System**

Criminal Justice System Broad components of criminal justice system. Policing styles and principles. Police's power of investigation. Filing of criminal charges. Policing a heterogeneous society. Correctional measures and rehabilitation of offenders. Custodial crimes: Complaints against police personnel; Interrogation of suspects and offenders; interviewing the criminals; improving the Police force. Human rights and criminal justice system in India

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=U4ep_vd14hI
2. https://www.youtube.com/watch?v=q54p4HF70-w
3. https://www.youtube.com/watch?v=FthBlnS0A-8
4. https://www.youtube.com/watch?v=FTkf7qHsPuM
5. https://www.youtube.com/watch?v=nHq6YOWkxRE
6. https://www.youtube.com/watch?v=qdiwbYohqyI

13. Books Recommended

1. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific and Investigative Techniques, 2ndEdition, CRC Press, Boca Raton (2005).
2. D.E. Zulawski and D.E. Wicklander, Practical Aspects of Interview and Interrogation, CRC Press, Boca Raton (2002).
3. R. Saferstein, Criminalistics, 8thEdition, Prentice Hall, New Jersey (2004).
4. J.L. Jackson and E. Barkley, Offender Profiling: Theory, Research and Practice, Wiley, Chi Chester (1997).
5. R. Gupta, Sexual Harassment at Workplace, LexisNexis, Gurgaon (2014).

01. Name of the Department: Forensic Science						
02. Course Name	Crime and Society Lab			**L**	**T**	**P**
03. Course Code	17040304			**0**	**0**	**4**
04. Type of Course (use tick mark)		Core (✓)	DSE ()	AEC ()	SEC ()	OE ()
05. Pre-requisite (if any)	10+2 with Science stream.	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practical						
Lectures = Nil		**Tutorials = Nil**		**Practical = 52**		

8.Course Description:

In this laboratory course students will be able to apply the theoretical knowledge of criminology and criminal justice system to review and comprehend the different crimes.

9.Course Objectives:

1. To learn and review about the different types of crime
2. To understand the deviant behaviour and its relation to crime
3. To understand the victimology in a heinous crime.
4. To develop the understanding of juvenile delinquency and its relation to crime

10. Course Outcomes (COs)

Upon successful completion of this course, the students will able to –

1. The importance of criminology and the causes of criminal behavior.
2. The significance of criminal profiling to mitigate crime.
3. The consequences of crime in society and the elements of criminal justice system
4. Understand the concept of Model policing, and rehabilitation of former convicts.

11. Unit wise detailed content

Practicals

1. To review past criminal cases and elucidate which theory best explains the criminal behavior of the accused.
2. To review crime cases where criminal profiling assisted the police to apprehend the accused.
3. To cite examples of crime cases in which the media acted as a pressure group.
4. To evaluate the post-trauma stress amongst victims of racial discrimination.
5. To correlate deviant behavior of the accused with criminality (take a specific example).
6. To evaluate victimology in a heinous crime.
7. To examine a case of juvenile delinquency and suggest remedial measures.
8. To evaluate how rising standards of living affect crime rate.
9. To review the recommendations on modernization of police stations and evaluate how far these have been carried out in different police stations.
10. To visit a ‘Model Police Station’ and examine the amenities vis-à-vis conventional police stations.
11. To examine steps being taken for rehabilitation of former convicts and suggest improvements.
12. To prepare a report on interrogation cells and suggest improvements

12. Books Recommended

1. DFS Manuals of Forensic Science

1. Name of the Department: Forensic Sciences						
2. Course Name	Technological Methods in Forensic Science			**L**	**T**	**P**
3. Course Code	17040305			4	0	0
4. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**GE ()**	**SEC ()**	
5. Pre-requisite (if any)	10+2 with Science Stream	**6. Frequency (use tick marks)**	**Even ()**	**Odd (✓)**	**Either Sem ()**	**Every Sem ()**
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		

8. Course Description:

In this core paper the student will be able to know about the modern and sophisticated instruments to examine the various forensic evidences and different aspects of forensic photography.

9.**Course Objectives:**

1. To learn about the different chromatographic techniques
2. To understand the basics of spectroscopy and different spectroscopic techniques
3. To learn about the principles, different types of microscopy and photography.
4. To understand the forensic application of instrumental techniques

10. Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1. The importance of chromatographic and spectroscopic techniques in processing crime scene evidence.
2. The utility of colorimetry, electrophoresis and neutron activation analysis in identifying chemical and biological materials.
3. The significance of microscopy in visualizing trace evidence and comparing it with control samples.
4. The usefulness of photography and videography for recording the crime scenes.

11. Unit wise detailed content

Unit-1	**Number of lectures=13**	**Title of the unit- Instrumentation- I**

Chromatographic methods. Fundamental principles and forensic applications of thin layer chromatography, gas chromatography and liquid chromatography.

Spectroscopic methods. Fundamental principles (Lambert-Beer law) and forensic applications of Ultraviolet-visible spectroscopy, infrared spectroscopy, and atomic absorption spectroscopy

Unit-2	**Number of lectures=13**	**Title of the unit- Instrumentation- II**

X-ray spectrometry, mass spectroscopy, and electrophoresis – fundamental principles and forensic applications. Neutron activation analysis – fundamental principles and forensic applications.

Unit – 3	**Number of lectures=13**	**Title of the unit- Microscopy**

Fundamental principles, concept of image formation. Different types of microscopes used in forensic science- Simple microscope, compound microscope, stereo-microscope, comparison microscope, polarized microscope, and electron microscope (SEM, and TEM). Forensic applications of microscopy

Unit – 4	**Number of lectures=13**	**Title of the unit: Forensic photography**

Basic principles and applications of photography in forensic science. 3D photography. Photographic evidence. Infrared and ultraviolet photography. Digital photography. Videography. Crime scene and laboratory photography. DSLR Camera functions.

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=HFGRXL9Ihds
2. https://www.youtube.com/watch?v=KiOzQ-K0gEQ
3. https://www.youtube.com/watch?v=citMv0hvfyc
4. https://www.youtube.com/watch?v=CzQAtSXaKVs
5. https://www.youtube.com/watch?v=hRer5xSP2HQ
6. https://www.youtube.com/watch?v=3bXFuccJqko

13. Books Recommended

1. D.A. Skoog, D.M. West and F.J. Holler, *Fundamentals of Analytical Chemistry,* 6th Edition, Saunders College Publishing, Fort Worth (1992).
2. W. Kemp, *Organic Spectroscopy*, 3rd Edition, Macmillan, Hampshire (1991).
3. J.W. Robinson, *Undergraduate Instrumental Analysis*, 5th Edition, Marcel Dekker, Inc., New York (1995).
4. 4. D.R. Redsicker, *The Practical Methodology of Forensic Photography*, 2nd Edition, CRC Press, Boca Raton(2000).

1. Name of the Department: Forensic Sciences						
2. Course Name	Technological Methods in Forensic Science Lab			**L**	**T**	**P**
3. Course Code	17040306			0	0	4
4. Type of Course (use tick mark)		Core (✓)	DSE ()	AEC ()	SEC ()	OE ()
5. Pre-requisite (if any)	10+2 with Science Stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 00		**Tutorials = 00**		**Practical = 52**		

8.Course Description:

In this laboratory course students will be able to apply the theoretical knowledge of instrumental techniques to prepare the sample for examination and comparison of them.

9.Course Objectives:

1. To learn about the preparation of chromatographic plate and samples for examination
2. To learn about the microscope and its different parts
3. To understand the comparison process using different microscopes.
4. To develop the understanding of different parts of DSLR camera and their working

10. Course Outcomes (COs):

Upon successful completion of this course, the students will be able to

1. Students will be able to learn different types of tools and techniques used in forensic science.
2. They would develop the understanding of the instrumentation concept in forensic science.
3. They would be able to learn the analytical methods in forensic science.
4. They would be able to record the crime scene and physical evidences with the help of photography.

11. Practicals

1. To conduct paper chromatography for ink and Rf value determination.
2. To prepare a TLC plate.
3. To conduct TLC for drugs.
4. To study different parts of microscope.
5. To learn working and functioning of Ultraviolet- visible spectroscopy
6. To compare various forensic evidences using compound microscopic techniques.
7. To compare various forensic evidences using stereo-microscopic techniques.
8. To study the different parts of camera and its working.

12. Books Recommended

1. Lab Manuals of DFSS

1. Name of the Department: Forensic Sciences						
2. Course Name	**Computer Science**			**L**	**T**	**P**
3. Course Code	17040307			2	0	0
4. Type of Course (use tick mark)		Core ()	DSE ()	GE (✓)	SEC ()	
5. Pre-requisite (if any)	10+2 with Science Stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 26		**Tutorials = 00**		**Practical = Nil**		

8. Course Description:

This is generic elective course in forensic sciences. The students will be able to know about the basic knowledge of fundamentals of C programming, arrays and functions in C. Basic concepts structures and pointers and input and output in C.

9.**Course Objectives:**

1. To learn about the basics of C Programming
2. To understand the different arrays
3. To learn about the pointers
4. To understand the input and outputs

10. Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

1. Understand the fundamentals of c programming and arrays and functions in C
2. Explain the structures and pointers.
3. Understand the various components of input
4. Understand the various components of output

11. Unit wise detailed content

Unit-1	**Number of lectures=7**	**Title of the unit-** Fundamentals of C Programming and Arrays and Functions in C

History of C -Characteristics of C - C Program Structure - Data Types - Variables and Constants - Operators - Conditional Statements - Looping and Iteration.
Single Dimensional Array -Multi Dimensional Array - Types of functions - Functions and Arrays - String Functions - Recursive Functions

Unit – 2	**Number of lectures=7**	**Title of the unit-** Structures

Basics, Structures and functions - Arrays of structures - Pointers to structures - Self-referential structures - Typedef - Union - Bit fields - Enum Data Types.

Unit – 3	**Number of lectures=7**	**Title of the unit-** Pointers

Pointers: Introduction - declaration - passing function to pointers - pointers with arrays - dynamic memory allocation.

Unit – 4	**Number of lectures=13**	**Title of the unit:** Input and Output

File management and Console input and output – Functions for file management - Standard I/O, Formatted output - Formatted input - File access - Error handling.

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=OYJWARSlWZs
2. https://www.youtube.com/watch?v=SPuS9UJF1lo
3. https://www.youtube.com/watch?v=HV9ba0bNvGQ
4. https://www.youtube.com/watch?v=25uPAfiinWc

5. https://www.youtube.com/watch?v=1fi2CPGcdA8
6. https://www.youtube.com/watch?v=dw889ubtFR8

13. Books Recommended

1. E. Balagurusamy , Programming in Ansi C , 6th Edition, TMG - India 2012.
2. Herbert Schildt, The Complete Reference C, 4th Edition, Tata Mc - Graw Hill, 2000.
3. Byron C Gottfried, Programming with C, Schaums' outline series 2nd Edition, Tata Mc - Graw Hill, 2006.

1. Name of the Department: Forensic Sciences						
2. Course Name	Botany			**L**	**T**	**P**
3. Course Code	17040308			2	0	0
4. Type of Course (use tick mark)		Core ()	DSE ()	AEC ()	SEC ()	GE (✓)
5. Pre-requisite (if any)	10+2 with Science Stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()

7. Total Number of Lectures, Tutorials, Practicals		
Lectures = 26	**Tutorials = 00**	**Practical = Nil**

8. Course Description:

In this core paper the student will be able to know about the basics about different plant tissues, parts of plants, and adaptive and protective systems of plants.

9.Course Objectives:

1. To learn about the basics of botany
2. To understand the types of plant tissues
3. To learn about the adaptive and protective systems of plants
4. To understand the details about different parts of the plants

10. Course Outcomes (COs):

Upon successful completion of this course, the students will be able to understand:

1. The basics of botany and its scope
2. Simple and complex tissues
3. Pollination mechanisms and adaptations
4. Embryo endosperm relationship.

11.Unit wise detailed content

Unit-1	**Number of lectures=7**	**Title of the unit: Basic Concepts of Botany**

General plant classification schemes. Sub specialization of forensic botany- plant morphology, plant anatomy, plant systematic, palynology, plant ecology, limnology, Plant architecture- roots, stems, flowers, leaves.

Unit-2	**Number of lectures=7**	**Title of the unit: Meristematic and permanent tissues**

Root and shoot apical meristems; Simple and complex tissues. Structure of dicot and monocot root stern and leaf.

Unit – 3	**Number of lectures=7**	**Title of the unit: Adaptive and protective systems**

Epidermis, cuticle, stomata; General account of adaptations in xerophytes and hydrophytes. Structure of anther and pollen; Structure and types of ovules; Types of embryo sacs, organization, Pollination mechanisms and adaptations; Double fertilization.

Unit – 4	**Number of lectures=5**	**Title of the unit: Embryo, endosperm, and other parts of plant**

Endosperm types, structure and functions; Dicot and monocot embryo; Embryo endosperm relationship. Identification and matching of various types of wood, timber varieties, seeds and leaves.

12. Brief Description of self learning / E-learning component

1. https://www.youtube.com/watch?v=Q8KIQSoUufU
2. https://www.youtube.com/watch?v=ttFWNV9dvcw
3. https://www.youtube.com/watch?v=P-ACTCKdGiY
4. https://www.youtube.com/watch?v=EgiET_piGpA
5. https://www.youtube.com/watch?v=lwKw1mHXF2o
6. https://www.youtube.com/watch?v=HljqWcEZmYw

13. Books Recommended

1. Bhojwani, S.S. & Bhatnagar, S.P. (2011). Embryology of Angiosperms. Vikas Publication House Pvt. Ltd. New Delhi. 5th edition.
2. Mauseth, J.D. (1988). Plant Anatomy. The Benjamin/Cummings Publisher, USA.
3. Taiz, L., Zeiger, E., (2010). Plant Physiology. Sinauer Associates Inc., U.S.A. 5th Edition.
4. Hopkins, W.G., Huner, N.P., (2009). Introduction to Plant Physiology. John Wiley & Sons, U.S.A. 4th Edition.
5. Bajracharya, D., (1999). Experiments in Plant Physiology- A Laboratory Manual. Narosa Publishing House, New Delhi.

1. Name of the Department: Forensic Sciences						
2. Course Name	Handwriting Identification and recognition			**L**	**T**	**P**
3. Course Code	17040309			2	0	0
4.Type of Course (use tick mark)		Core ()	DSE ()	GE ()	SEC (✓)	
5. Pre-requisite (if any)	10+2 with Science Stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 26		**Tutorials = 00**		**Practical =00**		

8. Course Description:

In this skill enhancement course of forensic sciences, the student will be able to know about the basic knowledge of handwriting in examination of forensic questioned documents.

9.**Course Objectives:**

1. To learn about the basics of handwriting identification and factors affecting it
2. To understand the natural variation in handwriting & principles of handwriting identification
3. To understand the process of handwriting examination and comparison
4. To understand the different steps of handwriting examination

10. Course Outcomes (COs):

Upon successful completion of this course, the students will be able to:

1. Know the important features in Handwriting Identification.
2. Understand the basis of handwriting characteristics.
3. Explain the significance of Forensic documentation
4. To establish the natural variations and their significance in forensic handwriting analysis.

11. Unit wise detailed content

Unit-1	**Number of lectures = 7**	**Title of the unit-** Handwriting Identification

Basis of handwriting identification. Characteristics of handwriting – scope and application. Class and individual characteristics. Arrangement, alignment, margin, slant, speed, pressure, spacing, line quality, embellishments, movement and pen lifts. Factors influencing handwriting – physical, mechanical, genetic and physiological

Unit – 2	**Number of lectures = 7**	**Title of the unit-** Natural variation in Handwriting & principles of handwriting Identification

Natural Variations in handwriting, significance and effects of natural variations in handwriting examination, Principles of handwriting examination and identification

Unit – 3	**Number of lectures = 7**	**Title of the unit-** Comparison of Handwriting

Basis of handwriting comparison. Characteristics of handwriting Forgery detection. Counterfeiting. Examination of altered and erased documents. Tools used in handwriting examination.

Unit – 4	**Number of lectures = 5**	**Title of the unit:** Handwriting Recognition

Basis of handwriting recognition. Off-line and on-line handwriting recognition. Steps involved in handwriting recognition – pre-processing, feature extraction and classification. Applications of handwriting recognition.

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=4iCBLgMEoNM
2. https://www.youtube.com/watch?v=ky19Kuw-Tvo
3. https://www.youtube.com/watch?v=cLMmSQcnx5g&t=226s
4. https://www.youtube.com/watch?v=lyiduk9rzLU
5. https://www.youtube.com/watch?v=5vDjCdg9pN0
6. https://www.youtube.com/watch?v=Q6_JxEGEOVM

13. Books Recommended.

1. O. Hilton, Scientific Examination of Questioned Documents, CRC Press, Boca Raton (1982).
2. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4thEdition, Foundation Press, New York (1995).
3. R.N. Morris, Forensic Handwriting Identification: Fundamental Concepts and Principles, Academic Press, London (2000).
4. E. David, The Scientific Examination of Documents – Methods and Techniques, 2ndEdition, Taylor & Francis, Hants (1997).
5. Z. Liu, J.H. Cai and R. Buse, Handwriting Recognition: Soft Computing and Probabilistic Approach (Volume 103), Springer Science and Business Media (2003).

Semester-IV

1. Name of the Department: Forensic Sciences						
2. Course Name	Forensic Chemistry			**L**	**T**	**P**
3. Course Code	17040401			4	0	0
4. Type of Course (use tick mark)		Core (✓)	DSE ()	GE ()	SEC ()	
5. Pre-requisite (if any)	10+2 with science stream	**6. Frequency (use tick marks)**	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = 00**		**Practical =00**		

8. Course Description:

This is Core paper in Forensic Sciences, the student will be able to know about the basic knowledge of petroleum products in crime scene evidence. Classification of explosives, including the synthesis and characterization of representative analogs. Characteristics of the narcotics, drugs and psychotropic substances.

9. Course Objectives:

1. The students will be able to understand the various areas of Forensic Chemistry.
2. To study the significance of Petroleum Products in Forensic situations.
3. To understand the scientific investigation of several Arson cases.
4. To learn about the various categories of explosives and mechanism of explosion.

10. Course Outcomes (COs):

Upon successful completion of this course, the students will be able to understand

1. The methods of analyzing trace amounts of petroleum products in crime scene evidence.
2. The method of searching, collecting, preserving and analyzing arson evidence.
3. The classification of explosives, including the synthesis and characterization of representative analogs.
4. The significance of bomb scene management.

11. Unit wise detailed content

Unit-1	**Number of lectures=13**	**Title of the unit- Introduction to Forensic Chemistry**
Definition, need and scope of forensic chemistry, various types of evidences and cases encountered. Alcohol-introduction, different types of alcohol and analysis, country-made liquor, clandestine laboratories, trap cases		
Unit-2	**Number of lectures=13**	**Title of the unit- Petroleum and Petroleum Products**
Distillation and fractionation of petroleum. Commercial uses of different petroleum fractions. Analysis of petroleum products. Analysis of traces of petroleum products in forensic exhibits. Comparison of petroleum products. Adulteration of petroleum products.		
Unit – 3	**Number of lectures=13**	**Title of the unit- Cases Involving Arson**
Chemistry of fire- fire triangle and tetrahedron. Conditions for fire. Fire scene patterns. Location of point of ignition. Recognition of type of fire. Searching the fire scene. Collection and preservation of arson evidence. Analysis of fire debris. Analysis of ignitable liquid residue. Post-flashover burning. Scientific investigation and evaluation of clue materials. Information from smoke staining.		
Unit – 4	**Number of lectures=13**	**Title of the unit- Explosives**

Classification of explosives – low explosives and high explosives. Improvised Explosive Devices. Military explosives. Blasting agents. Characteristics of TNT, PETN and RDX. Explosion process. Blast waves. Bomb scene management. Searching the scene of explosion. Mechanism of explosion. Post blast residue collection and analysis.

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=tjvTMavQxbA
2. https://www.youtube.com/watch?v=M0FMjt4fRr4
3. https://www.youtube.com/watch?v=2WRy1ekd2eU
4. https://www.youtube.com/watch?v=s1Yg7ArhLbE
5. https://www.youtube.com/watch?v=8q4_GYDHODk
6. https://www.youtube.com/watch?v=MvMXQKXtM2M
7. https://www.youtube.com/watch?v=ufyExZkg-q8
8. https://www.youtube.com/watch?v=eFIWNk_1xNU
9. https://www.youtube.com/watch?v=BpN7ZY_gpjU

13. Books Recommended.

1. J.D. DeHaan, Kirk's Fire Investigation, 3rdEdition, Prentice Hall, New Jersey(1991).
2. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4thEdition, The Foundation Press, Inc., New York(1995).
3. R. Saferstein, Criminalistics, 8thEdition, Prentice Hall, New Jersey(2004).
4. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton(2010).
5. S. Ballou, M. Houck, J.A. Siegel, C.A. Crouse, J.J. Lentini and S. Palenik in Forensic Science, D.H. Ubelaker (Ed.), Wiley-Blackwell, Chichester (2010).

1. Name of the Department: Forensic Sciences						
2. Course Name	Forensic Chemistry Lab			**L**	**T**	**P**
3. Course Code	17040402			0	0	4
4. Type of Course (use tick mark)		Core (✓)	DSE ()	AEC ()	SEC ()	OE ()
5. Pre-requisite (if any)	10+2 with science stream	**6. Frequency (use tick marks)**	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 00		**Tutorials = 00**		**Practical =52**		

8. Course Description:

In this laboratory course, the students will be able to apply the knowledge of forensic chemistry to analyze samples of gasoline, diesel, kerosene oil and explosive substances etc.

9.Course Objectives:

1. The students will be able to perform the examination of gasoline and diesel samples.
2. To carry out the extraction of arson accelerators.
3. To apply the techniques for analyzing ethanol and methanol.
4. To perform thin layer chromatography for the separation of explosive substances.

10. Course Outcomes (COs):

Upon successful completion of this course, the students will be able to

1. Analyze Flammable gases.
2. Relate evidences with crime scenes
3. Utilize different physical evidences such as Explosive evidence.
4. Understand physical matching in cases of Bomb scene management.

11. Practicals

1. To carry out analysis of gasoline.
2. To carry out analysis of diesel.
3. To carry out analysis of kerosene oil.
4. To carry out ethanol analysis
5. To carry out methanol analysis
6. To extract and analyze arson accelerators.
7. To carry out analysis of explosive substances.
8. To separate explosive substances using thin layer chromatography.

12. Books Recommended

1. Lab Manuals of DFSS

1. Name of the Department: Forensic Sciences						
2. Course Name	Forensic Biology			**L**	**T**	**P**
3. Course Code	17040403			4	0	0
4. Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	GE ()	SEC ()	
5. Pre-requisite (if any)	10+2 with science stream	**6. Frequency (use tick marks)**	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = 00**		**Practical =00**		

8. Course Description:

This is core paper in Forensic Sciences; the student will be able to know about the basic knowledge of biological and serological evidence. Importance of biological fluids – blood, urine, semen, saliva, sweat and milk – in crime investigations and importance of bloodstain patterns in reconstructing the crime scene.

9. Course Objectives:

1. To introduce the concept of various biological evidences encountered in forensic cases.
2. To study the Forensic significance of microbial organisms.
3. To familiarize students with the fundamental of Wildlife Forensic.
4. To understand the concept of Forensic Entomology.

10. Course Outcomes (COs):

1. The significance of biological and serological evidence.
2. The forensic importance of hair evidence.
3. The importance of biological fluids – blood, urine, semen, saliva, sweat and milk – in crime investigations.
4. The importance of bloodstain patterns in reconstructing the crime scene.

11. Unit wise detailed content

Unit-1	**Number of lectures=13**	**Title of the unit: Biological Evidence – I**

Nature and importance of biological evidence. Significance of hair evidence. Transfer, persistence and recovery of hair evidence. Structure of human hair. Comparison of hair samples. Morphology and biochemistry of human hair. Comparison of human and animal hair. Fibre evidence – artificial and man-made fibres. Collection of fibre evidence. Identification and comparison of fibres.

Unit-2	**Number of lectures=13**	**Title of the unit: Biological Evidence – II**

Types and identification of microbial organisms of forensic significance. Identification of wood, leaves, and pollens as botanical evidence. Diatoms and their forensic significance.

Unit – 3	**Number of lectures=13**	**Title of the unit: Wildlife Forensics**

Fundamentals of wildlife forensic. Significance of wildlife forensic. Protected and endangered species of animals and plants. Illegal trading in wildlife items, such as skin, fur, bone, horn, teeth, flowers and plants. Identification of physical evidence pertaining to wildlife forensics. Identification of pug marks of various animals

Unit – 4	**Number of lectures=13**	**Title of the unit: Forensic Entomology**

Basics of forensic entomology. Life cycle of insects (blow fly, flesh fly, and house fly) of forensic importance. Collection of entomological evidence during death investigations.

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=lpgBJyK9QGU
2. https://www.youtube.com/watch?v=49gSR3GSZxk
3. https://www.youtube.com/watch?v=efPx0avVh5w
4. https://www.youtube.com/watch?v=1bnBhCsNNps&t=81s
5. https://www.youtube.com/watch?v=5zh76-Q8tAk&t=223s
6. https://www.youtube.com/watch?v=jugwWdU5m94
7. https://www.youtube.com/watch?v=HIVKISCmjTQ
8. https://www.youtube.com/watch?v=-hy7BbushDY
9. https://www.youtube.com/watch?v=PYUjMhuwBNo

13. Books Recommended.

1. L. Stryer, Biochemistry, 3rdEdition, W.H. Freeman and Company, New York(1988).
2. R.K. Murray, D.K. Granner, P.A. Mayes and V.W. Rodwell, Harper's Biochemistry, APPLETON & Lange, Norwalk(1993).
3. S. Chowdhuri, Forensic Biology, BPRD, New Delhi (1971).
4. R. Saferstein, Forensic Science Handbook, Vol. III, Prentice Hall, New Jersey(1993).
5. G.T. Duncan and M.I. Tracey, Serology and DNA typing in, Introduction to Forensic Sciences, 2ndEdition, W.G. Eckert (Ed.), CRC Press, Boca Raton(1997).

1. Name of the Department: Forensic Sciences						
2. Course Name	Forensic Biology Lab			**L**	**T**	**P**
3. Course Code	17040404			0	0	4
4. Type of Course (use tick mark)		Core (✓)	DSE ()	AEC ()	SEC ()	OE ()
5. Pre-requisite (if any)	10+2 with science stream	**6. Frequency (use tick marks)**	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 00		**Tutorials = 00**		**Practical = 52**		

8. Course Description:

In this laboratory course, the students will be able to apply the knowledge of Forensic Biology for the examination of various biological samples like human hair samples, pollen grains and diatoms.

9. Course Objectives:

1.The students will be able to do species examination from hair samples.
2.To analyze scale pattern, medulla and cortex of human hair samples.
3.To apply the technique of microscopy for the examination of pollen grains and diatoms.
4.To understand the concept of report writing for Forensic Wildlife cases.

10. Course Outcomes (COs):

Students would be able

1. To examine hair and fibre morphology
2. Relate evidences with crime scenes
3. To describe forensic entomology.
4. To explain wildlife forensics

11. Practicals

1. To examine hair morphology and determine the species to which the hair belongs.
2. To prepare slides of scale pattern of human hair.
3. To examine human hair for cortex and medulla.
4. To carry out microscopic examination of pollen grains.
5. To carry out microscopic examination of diatoms.
6. To carry out fibre analysis.
7. To prepare a case report on forensic entomology.
8. To prepare a case report on problems of wildlife forensics.

12. Books Recommended

1. Lab Manuals Of DFSS

1. Name of the Department: Forensic Sciences						
2. Course Name	Questioned Documents			**L**	**T**	**P**
3. Course Code	17040406			4	0	0
4.Type of Course (use tick mark)		**Core (✓)**	**DSE ()**	**GE ()**	**SEC ()**	
5. Pre-requisite (if any)	10+2 with science stream	**6. Frequency (use tick marks)**	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = 00**		**Practical =00**		

8. Course Description:

This is core paper in Forensic Sciences; the students will be able to know about the basic importance of examining questioned documents in crime cases. Tools required for examination of questioned documents and significance of comparing hand-writing samples.

9. Course Objectives:

1. To introduce the concept of Questioned Document examination in forensic cases.
2. To learn about the examination of various categories of disputed documents.
3. To understand the aspects of handwriting comparison.
4. To familiarize students with various types of forgeries.

10. Course Outcomes (COs):

1. The importance of examining questioned documents in crime cases.
2. The tools required for examination of questioned documents
3. The significance of comparing hand writing samples.
4. The importance of detecting frauds and forgeries by analyzing questioned documents

11. Unit wise detailed content

Unit-1	**Number of lectures=13**	**Title of the unit- Nature and Scope of Questioned Documents**

Definition of questioned documents. Types of questioned documents. Preliminary examination of documents. Basic tools needed for forensic documents' examination – ultraviolet, visible, infrared and fluorescence spectroscopy, photomicrography, microphotography, visible spectral comparator, electrostatic detection apparatus. Determining the relative age of documents

Unit-2	**Number of lectures=13**	**Title of the unit- Disputed Documents**

Disputed documents – Property papers, cheques, suicidal letter, threatening letters, anonymous letters, fake currency notes, and Disguised writings. Examination of disputed documents.

Unit – 3	**Number of lectures=13**	**Title of the unit- : Comparison of Documents**

Comparison of handwriting. Development of individuality in handwriting. Natural variations and fundamental divergences in handwritings. Class and individual characteristics. Exemplar and non-exemplar samples during comparison of handwriting. Standards for comparison of handwriting. Comparison of paper, ink, printed documents, typed documents, Xeroxed documents

Unit – 4	**Number of lectures=13**	**Title of the unit: Forgeries**

Definition, and types of forgeries, Alterations in documents, including erasures, additions, over-writings and obliterations. Indented and invisible writings. Charred documents. Examination of counterfeit documents: passports, visas and stamp papers. Tools and techniques in questioned documents examination.

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=e2pzkdkUxLU
2. https://www.youtube.com/watch?v=Z1ojNCWRuFk
3. https://www.youtube.com/watch?v=OzTuFudWbQk
4. https://www.youtube.com/watch?v=AxubbuQJ9LU
5. https://www.youtube.com/watch?v=eOfa0RrBxbI
6. https://www.youtube.com/watch?v=RQdou4CCBUI
7. https://www.youtube.com/watch?v=TZA7zEXIg0M
8. https://www.youtube.com/watch?v=p9bmGt1_Pxo
9. https://www.youtube.com/watch?v=-x5S4X9mhMM

13. Books Recommended.

1. O. Hilton, Scientific Examination of Questioned Documents, CRC Press, Boca Raton (1982).
2. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4thEdition, Foundation Press, New York(1995).
3. R.N. Morris, Forensic Handwriting Identification: Fundamental Concepts and Principles, Academic Press, London(2000).
4. E. David, The Scientific Examination of Documents – Methods and Techniques, 2ndEdition, Taylor & Francis, Hants(1997).

1. Name of the Department: Forensic Sciences						
2. Course Name	Questioned Document Lab			**L**	**T**	**P**
3. Course Code	17040407			0	0	4
4. Type of Course (use tick mark)		Core (✓)	DSE ()	AEC ()	SEC ()	OE ()
5. Pre-requisite (if any)	10 +2 with Science Stream	**6. Frequency (use tick marks)**	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 00		**Tutorials = 00**		**Practical = 52**		

8.Course Description:

In this laboratory course, the students will be able to apply the knowledge of Questioned Document for the examination of handwriting characteristics and various categories of forgeries.

9. Course Objectives:

1. The students will be able to compare different handwriting samples.
2. To detect the simulated and traced forgery.
3. To learn about the security features of currency notes and plastic money.
4. To perform the analysis of alterations, obliterations and erasures in handwriting samples.

10. Course Outcomes (COs):

1. Students would be able to know handwriting characters.
2. They would also be able to relate evidences with crime scenes
3. They would compare handwriting samples.
4. They will be able to perform the analysis of alterations, obliterations and erasures in handwriting samples.

11. Practicals

1. To identify handwriting characters.
2. To study natural variations in handwriting.
3. To compare handwriting samples.
4. To detect simulated forgery.
5. To detect traced forgery.
6. To study the line quality defects in handwriting samples.
7. To examine the security features of currency notes, passports and plastic money.
8. To study alterations, obliterations and erasures in handwriting samples.

12. Books Recommended

1. Lab Manuals Of DFSS

1. Name of the Department: Forensic Sciences						
2. Course Name	Photography			**L**	**T**	**P**
3. Course Code	17040407			4	2	0
4.Type of Course (use tick mark)		Core ()	DSE ()	GE (✓)	SEC ()	
5. Pre-requisite (if any)	10 +2 with science stream	**6. Frequency (use tick marks)**	Even ()	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = 00**		**Practical =00**		

8. Course Description:

This is Generic paper in Forensic Sciences, the student will be able to know about the basics of photography.

9. Course Objectives:

1. The students will be able to learn the concept of Forensic Photography.
2. To learn about the working and settings of DSLR camera.
3. To understand the concept of digital photography and videography.
4. To familiarize students with ssurveillance photography.

10. Course Outcomes (COs):

1. The importance and applications of photography in forensic science.
2. The tools required for Crime scene and laboratory photography.
3. The student will be able to perform crime scene photography and videography.
4. The student will be able to present the visual evidences in court of law.

11. Unit wise detailed content

Unit-1	**Number of lectures=13**	**Title of the unit- Forensic Photography**
Basic principles and applications of photography in forensic science. Required equipments for photography, Importance of Forensic photography in a crime scene investigation.		
Unit – 2	**Number of lectures=13**	**Title of the unit- : Types of Photography in Forensic Science**
3D imaging. Infrared and ultraviolet photography. Digital photography- videography, crime scene and laboratory photography. High speed photography and videography, Introduction to photographic instruments, Basic principles and techniques of Black & White and color photography.		
Unit – 3	**Number of lectures=13**	**Title of the unit: Working of Camera**
Understanding the working and settings of DSLR camera. F-Number, Shutter speed, aperture, Depth of field, ISO, Photographic evidence, court presentation, and photographic logs.		
Unit – 4	**Number of lectures=13**	**Title of the unit: Surveillance Photography**
Surveillance photography – Cameras of surveillance, Types of surveillance and accessions for surveillance photography. Aerial photography – concept and use of drones		

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=1BiERebOrp0
2. https://www.youtube.com/watch?v=9KuDkJOR31U
3. https://www.youtube.com/watch?v=3CCVPa6DtZ8
4. https://www.youtube.com/watch?v=9srSStavb8g
5. https://www.youtube.com/watch?v=B7Dopv6kzJA
6. https://www.youtube.com/watch?v=EL9J3Km6wxI
7. https://www.youtube.com/watch?v=qS1FmgPVLqw

8. https://www.youtube.com/watch?v=sZ_UcEoT0H0
9. https://www.youtube.com/watch?v=OSsC3VnMC7g

13. Books Recommended

1. Brian Black. DSLR Photography for Beginners. 2010
2. Scott Kelby. Scott Kelby's Digital Photography. Peachpit Press; 1st Edition, 2010
3. Bryan Peterson. Understanding Exposure, 3rd Edition. Amphoto Books; 2010)
4. Michael Langford, Anna Fox, Richard Sawdon Smith . Langford's Basic Photography: The Guide for Serious Photographers. Focal Press; 9th Edition, 2010
5. David Taylor. Digital Photography Complete Course. DK; Illustrated Edition, 2015)

1. Name of the Department: Forensic Sciences						
2. Course Name	Biostatistics			**L**	**T**	**P**
3. Course Code	17040408			4	2	0
4.Type of Course (use tick mark)		**Core ()**	**DSE ()**	**GE (✓)**	**SEC ()**	
5. Pre-requisite (if any)	10 +2 with science stream	**6. Frequency (use tick marks)**	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = 02**		**Practical =00**		

8. Course Description:

This is Generic paper in Forensic Sciences, the student will be able to know about the basics of Statistics used in Statistics such as Central tendencies, measures of dispersion, range etc.

9.Course Objectives:

1. The students will be able to learn the concept of research methodology and research design.
2. To understand the details of descriptive statistics.
3. To acquire the knowledge of different measures of variance.
4. To interpret the role of hypothesis testing.

10. Course Outcomes (COs):

1. The evaluate the central tendencies
2. The classification of measure of dispersion.
3. The importance of biostatistics
4. To interpret the role of hypothesis testing.

11. Unit wise detailed content

Unit-1	**Number of lectures=13**	**Title of the unit- Introduction**
Introduction to Research Methodology; Definition, Concept of research, scientific methods. Experimental research and non – experimental research design.		
Unit-2	**Number of lectures=13**	**Title of the unit- Sources & types of data**
Descriptive statistics: Measures of Central tendency- mean, median modes etc, Measures of dispersion- range, mean deviation, standard deviation etc. Index numbers, time series data, Correlation & Regression analysis. Observation, questionnaires, interview, schedules, case study methods		
Unit – 3	**Number of lectures=13**	**Title of the unit: Variance**
Variance- measures of relationship, covariance's, Karl Pearson's Correlation coefficient, Measures of skewness, kurtosis, Spearman Rank correlation		
Unit – 4	**Number of lectures=13**	**Title of the unit: Hypothesis**
Testing of Hypothesis-test statistics & critical region, test of significant attributes, Tests of mean, proportion, variance, difference of two means, two proportions, two variances. student' t, Chi-square		

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=xBFnYt61NYs
2. https://www.youtube.com/watch?v=vE86NeE9HDE
3. https://www.youtube.com/watch?v=I10q6fjPxJ0
4. https://www.youtube.com/watch?v=wDAd_QHKoOg
5. https://www.youtube.com/watch?v=rZciv-TrG9k
6. https://www.youtube.com/watch?v=sOb9b_AtwDg
7. https://www.youtube.com/watch?v=gUU_-_DUIss
8. https://www.youtube.com/watch?v=ZzeXCKd5a18
9. https://www.youtube.com/watch?v=mqBWigObPEs

13. Books Recommended.

1. A textbook of Biostatistics, C.R Kothari

1. Name of the Department: Forensic Sciences						
2. Course Name	Introduction to Biometry			**L**	**T**	**P**
3. Course Code	17040409			4	0	0
4.Type of Course (use tick mark)		**Core ()**	**DSE ()**	**GE ()**	**SEC (✓)**	
5. Pre-requisite (if any)	10+2 with science stream	**6. Frequency (use tick marks)**	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = 00**		**Practical =00**		

8. Course Description:

This is Skill enhancement course in Forensic Sciences, the students will be able to know about the basics of Biometry, psychological and behavioural biometrics.

9.Course Objectives:

1. The students will be able to learn about the fundamental aspects of biometric system.
2. To acquire the knowledge of various pperformance measures used in biometric systems.
3. To understand the concept of behavioral biometrics.
4. To learn about the details of Fingerprints scanners and Ppalmprint scanner.

10. Course Outcomes (COs):

1. The basis of biometry.
2. The classification of biometric processes.
3. The importance of behavioural biometry.
4. To learn about the details of Fingerprints scanners and Ppalmprint scanner.

11. Unit wise detailed content

Unit-1	**Number of lectures=13**	**Title of the unit- Fundamental Aspects**

Definition, characteristics and operation of biometric system. Classification of biometric systems – physiological and behavioural. Strength and weakness of physiological and behavioural biometrics. Multimodal biometrics.

Unit-2	**Number of lectures=13**	**Title of the unit- Biometric Processes**

Key biometric processes – Enrolment, identification and verification. Positive and negative identification. Performance measures used in biometric systems – FAR, FRR, GAR, FTA, FTE and ATV. Biometric versus traditional technologies

Unit – 3	**Number of lectures=13**	**Title of the unit-: Physiological Biometrics**

Fingerprints scanners, palm prints scanner, iris, retina, geometry of hand and face.

Unit – 4	**Number of lectures=13**	**Title of the unit: Behavioral Biometrics**

Biometrical Handwriting analysis, signature biometrics, keystrokes, gait and voice.

12. Brief Description of self learning / E-learning component

1. https://www.youtube.com/watch?v=7b4H9Izn4ig
2. https://www.youtube.com/watch?v=kjbDHOAM8cw
3. https://www.youtube.com/watch?v=h-gxQkUSPJ4
4. https://www.youtube.com/watch?v=xAy2DWnqpC8
5. https://www.youtube.com/watch?v=GMDggxifxqk
6. https://www.youtube.com/watch?v=L1WVA81tH9U
7. https://www.youtube.com/watch?v=T66Mi6UaQE0
8. https://www.youtube.com/watch?v=UG5shuQXttg
9. https://www.youtube.com/watch?v=mC2ZuWI72rY

13. Books Recommended

1. S. Nanavati, M. Thieme and R. Nanavati, Biometrics, Wiley India Pvt. Ltd. (2002).
2. P. Reid, Biometrics for Network Security, New Delhi (2004).
3. 3. J.R. Vacca, Biometric Technologies and Verification Systems, Butterworth-Heinemann, Oxford (2007).

Semester- V

1. Name of the Department: Forensic Sciences						
2. Course Name	Forensic Ballistics			**L**	**T**	**P**
3. Course Code	17040501			4	0	0
4. Type of Course (use tick mark)		Core (✓)	DSE ()	AEC ()	SEC ()	OE ()
5. Pre-requisite (if any)	10+2 with Science Stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		
8. Course Description:						
In this core paper the student will be able to know about the basic knowledge of firearms, their classifications, firing mechanisms, Types of ammunition, identification of ballistic evidences at the scene of crime and other related topics.						
9. Course Objectives: 1. To make students understand the basics of firearms, their classifications and firing mechanism. 2. To familiarize students with concepts of internal, external and terminal ballistics. 3. To demonstrate examination and identification of firearms and related evidence 4. To develop understanding about reconstruction and reporting of firearm related cases.						
10. Course Outcomes (COs):						
Upon successful completion of this course, the students will be able to: 1. Classify the firearms on the basis of characteristic features and their firing mechanisms. 2. Identify, examine and compare the bullet and cartridge cases for control and crime samples. 3. Understand the nature of firearm injuries and their medico-legal aspects 4. Estimate the range of firing.						
11. Unit wise detailed content						
Unit-1	**Number of lectures = 13**	**Title of the unit: Firearms & Classification**				
History and development of firearms. Classification of firearms according to bore, action, and handling. Weapon types and their operation. Firing mechanism.						
Unit-2	**Number of lectures = 13**	**Title of the unit: Internal, External & Terminal Ballistics**				
Internal ballistics – Definition, ignition of propellants, shape and size of propellants, manner of burning, and various factors affecting the internal ballistics. External Ballistics – Vacuum trajectory, effect of air resistance on trajectory, base drag, drop, drift, yaw, shape of projectile and stability, trajectory computation, ballistics coefficient and limiting velocity. Terminal Ballistics – Effect of projectile on hitting the target and wound ballistics. Ricochet.						
Unit – 3	**Number of lectures = 13**	**Title of the unit: Ammunition and its types**				
Types of ammunition. Constructional features and characteristics of different types of cartridges and bullets. Primers and priming compounds. Projectiles. Headstamp markings on ammunition. Different types of marks produced during the firing process on cartridge – firing pin marks, breech face marks, chamber marks, extractor and ejector marks.						
Unit – 4	**Number of lectures = 13**	**Title of the unit: Firearm and related Evidences**				

Identification and comparison of bullets and cartridge cases. Improvised, and country made firearms. IBIS, Determination of range of fire. GSR analysis. Reconstruction with respect to accident, suicide, murder and self-defence.

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=3kXNIoGUshs
2. https://www.youtube.com/watch?v=jietpKOrTJA
3. https://www.youtube.com/watch?v=7GVTV6oA6fk
4. https://www.youtube.com/watch?v=yCxBxbT5mkI
5. https://www.youtube.com/watch?v=1_ILUNXvecM
6. https://www.youtube.com/watch?v=Jd3o1nuvcrI
7. https://www.youtube.com/watch?v=2qVQmnFKb8o
8. https://www.youtube.com/watch?v=rPYTQlFNk5Q
9. https://www.youtube.com/watch?v=hNmX7Ybli1o

13. Books Recommended

1. B.J. Heard, Handbook of Firearms and Ballistics, Wiley and Sons, Chichester (1997).
2. W.F. Rowe, Firearms identification, Forensic Science Handbook, Vol. 2, R. Saferstein (Ed.), Prentice Hall, New Jersey (1988).
3. A.J. Schwoeble and D.L. Exline, Current Methods in Forensic Gunshot Residue Analysis, CRC Press, Boca Raton (2000).
4. E. Elaad. Encyclopedia of Forensic Science, Volume 2, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000).

01. Name of the Department: Forensic Sciences						
02. Course Name	Forensic Ballistics Lab			**L**	**T**	**P**
03. Course Code	17040502			**0**	**0**	**4**
04. Type of Course (use tick mark)		Core (✓)	DSE ()	AEC ()	SEC ()	OE ()
05. Pre-requisite (if any)	10+2 with Science stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
07. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical = 52**		

08. Course Description:

In this laboratory course of Forensic Ballistics, the student will develop an understanding of classification of firearms, various parts of firearms, their identification and examination methods.

09. Course Objectives:

1. To understand various parts of firearms.
2. To understand the firing mechanism and functioning of firearms.
3. To examine the firearm and related evidences encountered at the scene of crime.
4. To study the nature of firearm injuries and GSR.

10. Course Outcomes (COs):

After the successful completion of this course the students will able to:

1. Identify the firearms, and to understand their functioning.
2. Learn the firing mechanism and its impact on bullet and cartridge cases.
3. Learn different types of ammunition and gunshot residue.
4. Correlate the nature of injuries with distance, velocity of bullet, comparison of bullets from which the bullet was fired.

11. Unit wise detailed content

List of Practicals:

1. To study various parts of firearm.
2. To describe, with the aid of diagrams, the firing mechanisms of different types of firearms.
3. To estimate the range of fired bullets.
4. To carry out the comparison of fired bullets.
5. To carry out the comparison of fired cartridge cases.
6. To identify gunshot residue.
7. To correlate the nature of injuries with distance from which the bullet was fired.
8. To differentiate, with the aid of diagram, contact wounds, close range wounds and distant wounds.

12. Books Recommended.

1. Manuals of DFSS

1. Name of the Department: Forensic Sciences						
2. Course Name	Forensic Toxicology			**L**	**T**	**P**
3. Course Code	17040503			4	0	0
4. Type of Course (use tick mark)		Core (✓)	DSE ()	AEC ()	SEC ()	OE ()
5. Pre-requisite (if any)	10+2 with science Stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		

8. Course Description:

In this core paper of Forensic Sciences, the student will be able to know the basics of Forensic Toxicology, and processing the death scene of poisoning case. They will also learn the classification and characteristics of the narcotics, drugs and psychotropic substances.

9. Course Objectives:

1. To understand the concept of Forensic Toxicology and its application in crime investigation related to poisons and toxicological analysis.
2. To learn about different types of poisons and toxins encountered in toxicological crime cases.
3. To classify the poisons on the basis of their nature and mode of action.
4. To differentiate various types of poisons on the basis of the signs and symptoms on victim.

10. Course Outcomes (COs):

Upon successful completion of this course, the students will be able to understand

1. The significance of toxicological studies in forensic science
2. Different types of poisons and toxins in criminal cases of toxicological interest.
3. The absorption of poisons in body fluids.
4. The classification and characteristics of the narcotics, drugs and psychotropic substances.

11. Unit wise detailed content

Unit-1	**Number of lectures = 13**	**Title of the unit: Basics of Toxicology**

Definition, dosage, and routes of administration. Significance of toxicological findings. Techniques used in toxicology. Toxicological analysis and chemical intoxication tests. Post-mortem Toxicology.

Unit – 2	**Number of lectures = 13**	**Title of the unit: Poisons – I**

Classification of poisons. Physio-chemical characteristics and mode of action of poisons. Accidental, suicidal and homicidal poisonings. Signs and symptoms of common poisoning and their antidotes. Collection and preservation of viscera, blood and urine for various poison cases. Identification of biocides and metal salts in body fluids.

Unit – 3	**Number of lectures = 13**	**Title of the unit: Poisons – II**

Animal poisons and mode of action. Plant and vegetable poisons: Poisonous seeds, fruits, roots and mushrooms. Carbon monoxide poisoning.

Unit – 4	**Number of lectures=13**	**Title of the unit: Narcotics, Drugs and Psychotropic Substances**

Definition of narcotics, drugs and psychotropic substances. Broad classification – Narcotics, stimulants, depressants and hallucinogens. General characteristics and common example of each classification. Designer drugs. Presumptive and screening tests for narcotics, drugs and psychotropic substances. Human performance toxicology and Dope tests.

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=DX0ztvv7Lc8
2. https://www.youtube.com/watch?v=A0NNyjVvnYo
3. https://www.youtube.com/watch?v=5KJ8BRtCLoc
4. https://www.youtube.com/watch?v=TAAlg7qEaDE
5. https://www.youtube.com/watch?v=Qw02tUhPljI
6. https://www.youtube.com/watch?v=zG8goygsUTo
7. https://www.youtube.com/watch?v=iDWuEOLkI2g
8. https://www.youtube.com/watch?v=leYwVnJKYAs
9. https://www.youtube.com/watch?v=VkSpPvnEpl0

13. Books Recommended

1. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).
2. F.G. Hofmann, A Handbook on Drug and Alcohol Abuse, 2nd Edition, Oxford University Press, New York (1983).
3. S.B. Karch, The Pathology of Drug Abuse, CRC Press, Boca Raton (1996).
4. A. Poklis, Forensic toxicology in, Introduction to Forensic Sciences, 2nd Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).
5. A.W. Jones, Enforcement of drink-driving laws by use of per se legal alcohol limits: Blood and/or breath

01. Name of the Department: Forensic Sciences						
02. Course Name	Forensic Toxicology Lab			**L**	**T**	**P**
03. Course Code	17040504			**0**	**0**	**4**
04. Type of Course (use tick mark)		Core (✓)	DSE ()	AEC ()	SEC ()	OE ()
05. Pre-requisite (if any)	10+2 with science Stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
07. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical = 52**		

08. Course Description:

In this core paper of Forensic Toxicology, the students will be able to practically understand the concept of toxicological analysis in forensic cases. They will also learn to identify various types of poisons and toxins on the basis of their chemical analysis.

09. Course Objectives:

1. To identify biocides, metallic and organic poisons.
2. To perform the chemical analysis of chloroform.
3. To perform the screening for barbiturates and opioids.
4. To conduct screening for nicotine.

10. Course Outcomes (COs):

The students will able to understand

1. The methods of identifying and purifying narcotics, drugs and psychotropic substances.
2. The identification tests and parameters of biocides, metallic and organic poisons.
3. The screening tests for barbiturates and opioids.
4. The screening tests for nicotine.

11. Unit wise detailed content

List of Practicals:

1. To identify biocides.
2. To identify metallic poisons.
3. To identify organic poisons.
4. To perform chloroform testing.
5. To perform color tests for barbiturates
6. To perform screening test for nicotine
7. To perform screening test for cannabis
8. To perform screening test for opioids.

12. Books Recommended.

1. Manuals of DFSS

1. Name of the Department: Forensic Sciences						
2. Course Name	Forensic Serology			**L**	**T**	**P**
3. Course Code	17040505			4	0	0
4. Type of Course (use tick mark)		Core ()	DSE (✓)	AEC ()	SEC ()	OE ()
5. Pre-requisite (if any)	10+2 with Science stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		

8. Course Description:

In this core paper, the student will be able to develop basic knowledge of blood, urine, semen, saliva, sweat and milk – in crime investigations. Extracellular proteins and intracellular enzymes. They will also understand the significance of genetic marker along with sexual assault investigations.

9. Course Objectives:

1. To understand the concept and significance of Forensic Serology in crime investigations.
2. To understand the basics of sexual assault investigations and significance of biological fluids in forensic work.
3. To study the use of genetic markers in forensic investigations.
4. To understand the need and scope of blood spatter analysis in forensic work.

10. Course Outcomes (COs):

Upon successful completion of this course, the student will be able to learn:

1. The significance of Forensic Serology in crime investigation.
2. The importance of biological fluids – blood, urine, semen, saliva, sweat and milk – in crime investigations.
3. The usefulness of genetic markers in forensic investigations.
4. The forensic importance of bloodstain patterns

11. Unit wise detailed content

Unit-1	**Number of lectures=13**	**Title of the unit: Forensic Importance of Blood**

Common body fluids. Composition and functions of blood. Collection and preservation of blood evidence. Distinction between human and non-human blood. Determination of blood groups. Antigens and antibodies. Forensic characterization of bloodstains. Typing of dried stains. Blood enzymes and proteins.

Unit-2	**Number of lectures=13**	**Title of the unit: Forensic Importance of Body fluids - I**

Semen and its forensic significance. Composition, functions and morphology of spermatozoa. Collection, evaluation and tests for identification of semen. Individualization on the basis of semen examination.

Unit – 3	**Number of lectures=13**	**Title of the unit: Forensic Importance of Body fluids - II**

Composition, functions and forensic significance of saliva, sweat, milk and urine. Tests for their identifications.

Unit – 4	**Number of lectures=13**	**Title of the unit: Bloodstain Pattern Analysis**

Bloodstain characteristics. Impact bloodstain patterns. Cast-off bloodstain patterns. Projected bloodstain patterns. Contact bloodstain patterns. Blood trails. Bloodstain drying times. Documentation of bloodstain pattern evidence. Crime scene reconstruction with the aid of bloodstain pattern analysis.

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=obmO4HZaO7s
2. https://www.youtube.com/watch?v=efPx0avVh5w
3. https://www.youtube.com/watch?v=IeJM9DLaiMc
4. https://www.youtube.com/watch?v=-H0ss1kDf_I
5. https://www.youtube.com/watch?v=Quk-Dh65iHY
6. https://www.youtube.com/watch?v=r-8SXTHzJFU
7. https://www.youtube.com/watch?v=0jltioeaEyY
8. https://www.youtube.com/watch?v=42yZtlu3PJA&t=6s
9. https://www.youtube.com/watch?v=n1TvZvRoFi4

13. Books Recommended

1. W.G. Eckert and S.H. James, Interpretation of Bloodstain Evidence at Crime Scenes, CRC Press, Boca Raton (1989).
2. G.T. Duncan and M.I. Tracey in Introduction to Forensic Sciences, 2nd Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).
3. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).
4. 4. T. Bevel and R.M. Gardner, Bloodstain Pattern Analysis, 3rd Edition, CRC Press, Boca Raton (2008).

01. Name of the Department: Forensic Sciences						
02. Course Name	Forensic Serology Lab			**L**	**T**	**P**
03. Course Code	17040506			**0**	**0**	**4**
04. Type of Course (use tick mark)		Core ( )	DSE (✓)	AEC ()	SEC ()	OE ()
05. Pre-requisite (if any)	10+2 with Science Stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
07. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical = 52**		

08. Course Description:

In this laboratory paper of Forensic Serology the students will be able to learn practically the examination and analysis of various biological fluids of forensic significance like blood, urine, saliva, and semen.

09. Course Objectives:

1. To understand the procedure for the examination of biological fluids of forensic significance.
2. To determine the biological sample as blood, saliva and semen chemically.
3. To perform the microscopic examination for semen and seminal stains.
4. To perform the color test for blood and to study the significance of genetic markers.

10. Course Outcomes (COs):

The students will able to:

1. Examine and identify biological stains chemically and microscopically.
2. Understand the usefulness of genetic markers in forensic investigations.
3. Identify blood samples by chemical tests and study of blood stains patterns.
4. Determine blood group from fresh and dried blood samples.

11. Unit wise detailed content

List of Practicals:

1. To determine blood group from fresh blood samples.
2. To determine blood group from dried blood sample.
3. To identify blood samples by color tests.
4. To carry out the crystal test on a blood sample.
5. To identify the given stain as saliva.
6. To identify the given stain as urine.
7. To identify the given stain as semen using chemical tests.
8. To identify the given stain as semen microscopically.

12. Books Recommended

1. Manuals of DFSS

1. Name of the Department: Forensic Sciences						
2. Course Name	Economic Offences			**L**	**T**	**P**
3. Course Code	17040507			4	0	0
4.Type of Course (use tick mark)		Core ()	DSE (✓)	AEC ()	SEC ()	OE ()
5. Pre-requisite (if any)	10+2 with Science stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		

8. Course Description:

This is a Discipline specific elective course in Forensic Sciences, the student will be able to know about the basic knowledge of Economic crimes in India and their linkage with other crimes like Tax evasion, Excise duty evasion, Fraudulent bankruptcy, White collar crime, Economic exclusion, Black money, Corruption and bribery of public servants.

9. Course Objectives:

1. To understand various economic crimes.
2. To understand the linkage of economic crimes and other criminal acts.
3. To learn the concept of certain economic offences like tax evasions, fraudulent bankruptcy, and black money.
4. To understand the need and scope of forensic science in the detection of economic offences.

10. Course Outcomes (COs):

Upon successful completion of this course, the student will be able to understand

1. Various economical offences in the society and their detection parameters.
2. The economic crimes pertaining to national security.
3. Economic crimes linkage to other criminal acts.
4. The need and scope of forensic science in detection of economic offences.

11. Unit wise detailed content

Unit-1	**Number of lectures=13**	**Title of the unit: Taxonomy of Economic Offences**

Fundamentals of economics in economic offences. Tax evasion. Excise duty evasion. Fraudulent bankruptcy. White collar crime. Economic exclusion. Black money. Corruption and bribery of public servants. Money laundering and hawala transactions.

Unit-2	**Number of lectures=13**	**Title of the unit: Fraud and its elements**

Insurance frauds. Corporate frauds. Bank frauds. Ponzi scheme. Pyramid scheme. Illicit trafficking in contraband goods. Illicit trafficking in arms. Illicit trafficking in explosives. Illicit drug trafficking. Trafficking in human organs. Cultural objects trafficking. Racketeering in employment. Racketeering in false travel documents.

Unit – 3	**Number of lectures=13**	**Title of the unit: Applied Economics in Processing Evidence**

Forensic accountancy and forensic auditing. Valuation of economic losses. Violation of Intellectual Property Rights.

Unit – 4	**Number of lectures=13**	**Title of the unit: Prevention of Economic Offences**

Legislations to deal with different forms of economic offences. RBI Act. SEBI Act. Competition Commission of India Act. Credit card frauds. Enforcement agencies to deal with different forms of economic offences. International perspectives – measures adopted by FBI and INTERPOL. Case histories of economic offences.

12. Brief Description of self learning / E-learning component

1. https://www.youtube.com/watch?v=JNE8B5Ok8sA
2. https://www.youtube.com/watch?v=sIjACciadLg
3. https://www.youtube.com/watch?v=vHZYc7T4BvA
4. https://www.youtube.com/watch?v=NJuztwFX_lA
5. https://www.youtube.com/watch?v=21whfyf1jUA
6. https://www.youtube.com/watch?v=G_aJVGEWmuc
7. https://www.youtube.com/watch?v=oTjty8Utxc0&t=29s
8. https://www.youtube.com/watch?v=CQlD6WI8FRM
9. https://www.youtube.com/watch?v=PmbgJveA1C4

13. Books Recommended

1. R.V. Clarke, Situational Crime Prevention: Successful Case Studies, 2nd Edition, Criminal Justice Press, New York (1997).
2. S.P. Green, Lying, Cheating and Stealing: A Moral Theory of White Collar Crime, Oxford University Press, Oxford (2006).
3. G. Geis, R. Meier, L. Salinger (Eds.), White-Collar Crime: Classic & Contemporary Views, Free Press, New York (1995).
4. J. Reiman, The Rich get Richer and the Poor get Prison, Allyn & Bacon, Boston (1998).
5. Indian Audit and Accounts department, Audit of Fraud, Fraud Detection and Forensic Audit, 2007.
6. State Crime Branch, Haryana, Investigation of Economic Offences.

01. Name of the Department: Forensic Sciences						
02. Course Name	Economic Offences Lab			**L**	**T**	**P**
03. Course Code	17040508			**0**	**0**	**4**
04. Type of Course (use tick mark)		Core ()	DSE (✓)	AEC ()	SEC ()	OE ()
05. Pre-requisite (if any)	10+2 with Science stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
07. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical = 52**		

08. Course Description:

In this lab course of Economic Offences, the students will be able to develop a detailed understanding of various economic crimes and their linkage other criminal acts. The will learn the case studies pertaining to fraudulent bankruptcy, hawala transactions, drug trafficking, money laundering etc.

09. Course Objectives:

1. To understand various economic crimes.
2. To understand the linkage of economic crimes and other criminal acts.
3. To learn the concept of certain economic offences like tax evasions, fraudulent bankruptcy, and black money.
4. To study the cases related to various economic crimes and to prepare a conceptual report of the same cases.

10. Course Outcomes (COs):

The students will able to –

1. Understand the Steps involved in mitigating economic crimes.
2. Study the cases of bank fraud, illicit drug trafficking, hawala transactions in India and prepare a note on it and suggest measures to prevent such crimes.
3. The linkage of economic crimes and other criminal acts.
4. Prepare the case report of crimes pertaining to illicit financial transactions

11. Unit wise detailed content

List of Practicals:

1. To prepare a draft on fraudulent bankruptcy.
2. To cite a case of money laundering and hawala transactions in India and prepare a note on it.
3. To cite a case involving bank fraud and suggest measures to prevent such crimes.
4. To study a case involving illicit drug trafficking and trace the route by which the item was being smuggled.
5. To prepare a report on trafficking of heritage artefacts, including religious deities in India.
6. To study the applications of accounting software.
7. To review the legislative measures to deal with a particular economic offence, identifying the loopholes and suggesting ways to plug the loopholes.
8. To prepare a schedule of national agencies involved in curbing economic offences. Outline their specific duties.

12. Books Recommended

1. Manuals of DFSS

1. Name of the Department: Forensic Sciences						
2. Course Name	Accident Investigations			**L**	**T**	**P**
3. Course Code	17040509			4	0	0
4.Type of Course (use tick mark)		**Core ()**	**DSE (✓)**	**AEC ()**	**SEC ()**	**OE ()**
5. Pre-requisite (if any)	10+2 with Science stream	**6. Frequency (use tick marks)**	Even ()	Odd (✓)	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		

8. Course Description:

In this core paper in Forensic Sciences, the student will be able to learn basics of injuries resulting from accident, Biomechanics of injuries, Hit and run case investigations, and Trace evidence at accident sites.

9. Course Objectives:

1. To understand the basics of accident investigations forensically.
2. To document and investigate the accident cases.
3. To understand the concept pf crash movements, tachograph data, and route tracing.
4. To study the real time cases of accidents and to form the case reports for court presentations.

10. Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1. Document and investigate the accident cases forensically.
2. Understand the significance of Motor Vehicle evidences in accidents
3. Analyse the accident like pre-crash, post-crash movements of vehicle
4. Study of Tachographs, their data, and to prepare case reports for court presentation.

11. Unit wise detailed content

Unit-1	**Number of lectures=13**	**Title of the unit: Motor Vehicle Accidents**

Accident scene. Sources of forensic information. Eyewitness accounts. Extent of vehicle damage. Visibility conditions. Photographs of accident site. Estimation of speed. Tire marks, skid marks, scuff marks. Importance of air bags. Railway accidents.

Unit – 2	**Number of lectures=13**	**Title of the unit: Accident Analysis**

Pre-crash movement. Post-crash movement. Collision model. Gauging driver's reaction. Occupants's kinematics. Types of injuries resulting from accident. Biomechanics of injuries. Hit and run investigations. Trace evidence at accident sites.

Unit – 3	**Number of lectures=13**	**Title of the unit: Tachographs**

Forensic significance of tachograph data. Tachograph charts. Principles of chart analysis. Accuracy of speed record. Tire slip effects. Falsification and diagnostic signals. Route tracing.

Unit – 4	**Number of lectures=13**	**Title of the unit: Court Presentation**

Cases studies related to accidents: motor vehicle accidents, plane crash etc. Forming an expert opinion, case, case presentation.

12. Brief Description of self learning / E-learning component

1. https://www.youtube.com/watch?v=LifIg_uCQd0
2. https://www.youtube.com/watch?v=seN9pH0QrNU
3. https://www.youtube.com/watch?v=dhkSlJadfPs
4. https://www.youtube.com/watch?v=RFFmSgsgdEk
5. https://www.youtube.com/watch?v=YMi0xG9M4ro
6. https://www.youtube.com/watch?v=r9fCRO7dshs
7. https://www.youtube.com/watch?v=eKk46U2N2rA
8. https://www.youtube.com/watch?v=WO403s_-kdM
9. https://www.youtube.com/watch?v=R2W0YuqqZGk

13. Books Recommended

1. T.S. Ferry, Modern Accident Investigation and Analysis, Wiley, New York (1988).
2. D. Lowe, The Tachograph, 2nd Edition, Kogan Page, London (1989).
3. T.L. Bohan and A.C. Damask, Forensic Accident Investigation: Motor Vehicles, Michie Butterworth, Charlottesville (1995).
4. S.C. Batterman and S.D. Batterman in Encyclopedia of Forensic Sciences, Volume 1, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000).

01. Name of the Department: Forensic Sciences						
02. Course Name	Accident Investigations Lab			**L**	**T**	**P**
03. Course Code	17040510			**0**	**0**	**4**
04. Type of Course (use tick mark)		**Core ()**	**DSE (✓)**	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)	10+2 with Science Stream	**6. Frequency (use tick marks)**	**Even ()**	**Odd (✓)**	**Either Sem ()**	**Every Sem ()**
07. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical = 8**		

08. Course Description

In this lab course of Accident Investigations, the student will be able to learn the investigation of accident cases. They will learn the collection and interpretation of evidences in accident cases like Hit and run cases, train crash and plane crash.

09. Course Objectives:

1. To know about the various evidences encountered in the accident cases.
2. To learn the procedure of collection of evidences in accident cases.
3. To prepare case reports for court presentation.
4. To compare various evidences with the control sample in accident cases.

10. Course Outcomes (COs)

The students will be able to

1. Identify the evidences in accident cases.
2. Collect and preserve the evidences in the accident cases.
3. Characterize different tyre marks and skid marks
4. Understand how to prepare the report for the major accidents like train or road accidents.

11. Unit wise detailed content

List of Practicals:

1. To lift tire marks.
2. Comparison of tire marks
3. To study the pattern of skid marks.
4. To study the pattern of scuff marks.
5. To estimate the speed of the vehicle from skid marks.
6. To prepare a report on a major road accident.
7. To prepare a report on a major train accident.
8. To prepare a report on a major plane crash.

12. Books Recommended

1. Lab Manuals of DFSS

Semester-VI

Students need to opt two core courses and two Discipline Specific Elective Courses (DSEC).

A flexibility has given that the students may opt the project work in lieu of any one DSEC.

1. Name of the Department: Forensic Sciences						
2. Course Name	Forensic Anthropology			**L**	**T**	**P**
3. Course Code	17040601			4	0	0
4.Type of Course (use tick mark)		Core (✓)	DSE ()	AEC ()	SEC ()	OE ()
5. Pre-requisite (if any)	10+2 with science stream	**6. Frequency (use tick marks)**	Even(✓)	Odd()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		
8. Course Description:						
This core paper in Forensic Sciences, the student will be able to know about the basic knowledge of Forensic Sciences, identification of human bones. Determination of age, sex, stature from skeletal material.						
9. Course Objectives:						
1. To describe the role of anthropology in criminal justice system 2. To enumerate the applications of forensic anthropology in human identification 3. To define various methods for facial reconstruction 4. To cite the latest trends in anthropology and odontology						
10. Course Outcomes (COs):						
Upon successful completion of this course, the students will be able to understand 1. Importance of forensic anthropology in identification of persons. 2. Different techniques of facial reconstruction and their forensic importance. 3. Significance of somatoscopy and somatometry. 4. To cite the latest trends in anthropology and odontology						
11. Unit wise detailed content						
Unit-1	**Number of lectures=13**	**Title of the unit: Significance of Forensic Anthropology**				
Scope of forensic anthropology. Study of human skeleton. Nature, formation, and identification of human and non-human bones. Determination of age, (in children, juveniles and adults, old individuals, sex, stature and race from skeletal material, trauma analysis, and diseases of bones						
Unit – 2	**Number of lectures=13**	**Title of the unit: Personal Identification – Somatoscopy and Somatometry**				
Somatoscopy – observation of hair on head, forehead, eyes, root of nose, nasal bridge, nasal tip, chin, Darwin's tubercle, ear lobes, supra-orbital ridges, physiognomic ear breadth, circumference of head. Scar marks and occupational marks.						
Unit – 3	**Number of lectures=13**	**Title of the unit: Personal Identification – Somatometry**				
Somatometry – measurements of head, face, nose, cheek, ear, hand and foot, body weight, height. Indices - cephalic index, nasal index, cranial index, upper facial index, crural index and brachial index						

Unit – 4	Number of lectures=13	Title of the unit: Facial Reconstruction

Portrait Parle/ Bertillon system. Photofit/identi kit. Facial superimposition techniques. Cranio facial super imposition techniques – photographic super imposition, video superimposition, Roentgen graphic superimposition. Use of somatoscopic and craniometric methods in reconstruction. Importance of tissue depth in facial reconstruction. Genetic and congenital anomalies – causes, types, identification and their forensic significance.

12. Brief Description of self-learning / E-learning component

1. https://www.youtube.com/watch?v=S25TXneVLFs
2. https://www.youtube.com/watch?v=wW5dA-ly64o
3. https://www.youtube.com/watch?v=7axf-LN-edQ
4. https://www.youtube.com/watch?v=Z6qreL9eQ9s
5. https://www.youtube.com/watch?v=mWxcwr1BuU0
6. https://www.youtube.com/watch?v=8lUZIf9589E
7. https://www.youtube.com/watch?v=oFfgBJkUZBY
8. https://www.youtube.com/watch?v=6G0LvImAGAg
9. https://www.youtube.com/watch?v=4H_TaM19RuI
10. https://www.youtube.com/watch?v=FxVM9upcizs

13. Books Recommended

1. M.Y. Iscan and S.R. Loth, The scope of forensic anthropology in, Introduction to Forensic Sciences, 2nd Ed., W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).
2. D. Ubelaker and H. Scammell, Bones, M. Evans & Co., New York (2000).
3. S.Rhine, Bone Voyage: A Journey in Forensic Anthropology, University of Mexico Press, Mexico (1998).

1. Name of the Department: Forensic Sciences						
2. Course Name	Forensic Anthropology Lab			**L**	**T**	**P**
3. Course Code	17040602			**0**	**0**	**4**
4. Type of Course (use tick mark)		Core (✓)	DSE ()	AEC	SEC ()	OE ()
5. Pre-requisite (if any)	10+2 with Science stream	**6. Frequency (use tick marks)**	Even(✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical = 52**		

8. Course Description:

In this laboratory course of Forensic Anthropology, the student will be able to know about the basic knowledge of Forensic Sciences, identification of human bones. Determination of age, sex, stature from skeletal material.

9. Course Objectives:

1. To analyse various kinds of human skeletal remains
2. To differentiate human from animal bones
3. To apply techniques for different measurements for personal identification
4. To determine sex from bones

10. Course Outcomes (COs):

The students will able to –

1. Identify and describe different types of bones and their measurements.
2. Carry out craniometric measurements of human
3. Perform somatometric measurements on living subjects.
4. To determine sex from bones

11. Unit wise detailed content

Practicals

1. To determine of age from skull and teeth.
2. To determine of sex from skull.
3. To determine sex from pelvis.
4. To study identification and description of bones and their measurements.
5. To investigate the differences between animal and human bones.
6. To perform somatometric measurements on living subjects.
7. To carry out craniometric measurements of human skull.
8. To estimate stature from long bone length.

12. Books recommended:

1. Lab Manual Of DFSS

1. Name of the Department: Forensic Sciences						
2. Course Name	Forensic Medicine			**L**	**T**	**P**
3. Course Code	17040603			4	0	0
4. Type of Course (use tick mark)		Core (✓)	DSE ()	AEC ()	SEC ()	OE ()
5. Pre-requisite (if any)	10+2 with science stream	**6. Frequency (use tick marks)**	Even(✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		
8. Course Description:						
This core paper in Forensic Sciences, the student will be able to know about the basic knowledge of Death Investigations, Autopsy and Forensic Odontology.						
9. Course Objectives:						
1. To classify the various type of injuries and wounds 2. To estimate the time since death 3. To apply the legal procedure involve in autopsy 4. To understand the role of bite marks in personal identification						
10. Course Outcomes (COs):						
Upon successful completion of this course, the students will be able to: 1. The duties of the first responding officer who receives a call on homicide or suicide case. 2. The steps involved in processing the death scene. 3. The importance of ascertaining whether the crime was staged to appear as suicide or accident. 4. Understand the role of bite marks in personal identification						
11. Unit wise detailed content						
Unit-1	**Number of lectures=13**	**Title of the unit: Elements of Forensic Medicine**				
Fundamental aspects and scope of forensic medicine. Role and duties of Forensic Medicine Expert. Inquest and its types, Medical Evidence and Court Procedures. Post-mortem examination.						
Unit-2	**Number of lectures=13**	**Title of the unit: Death Investigations**				
Emergency Medical Response. Dying declaration. Documenting the death scene. Processing evidence. Evaluation of injuries. Evaluating the type of injuries, gauging the psychological state of victim, suicide notes.						
Unit – 3	**Number of lectures=13**	**Title of the unit: Forensic Pathology**				
Definition, and medico-legal aspects of death. Causes and manner of death. Determination of time since death. Investigation of sexual offences. Asphyxial deaths. Injuries - Types and classification of injuries, Antemortem and post mortem injuries, Aging of injuries, and Artificial injuries.						
Unit – 4	**Number of lectures=13**	**Title of the unit: Forensic Odontology**				
Development, scope and role of forensic odontology in mass disaster and anthropology. Types of teeth and their comparative anatomy. Bite marks. Forensic significance of bite marks. Collection, preservation and photography of bite marks evidence. Legal aspects of bite marks. Estimation of age from teeth.						
12. Brief Description of self learning / E-learning component						

1. https://www.youtube.com/watch?v=LaLt4S26F0w
2. https://www.youtube.com/watch?v=tmt-blJMQ9A
3. https://www.youtube.com/watch?v=z_OM-3Gnzec
4. https://www.youtube.com/watch?v=XhfYQsO_5gE&has_verified=1
5. https://www.youtube.com/watch?v=nHeFUT-11So&has_verified=1
6. https://www.youtube.com/watch?v=8nqgZn9Izv8
7. https://www.youtube.com/watch?v=y12JxtlFERo
8. https://www.youtube.com/watch?v=ItZa7PrX6r4
9. https://www.youtube.com/watch?v=SfyaN3B6N6Y

13. Books Recommended

1. K. Smyth, The Cause of Death, Van Nostrand and Company, New York (1982).
2. M. Bernstein, Forensic odontology in, Introduction to Forensic Sciences, 2nd Ed., W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).
3. J. Dix, Handbook for Death Scene Investigations, CRC Press, Boca Raton (1999).
4. H.B. Baldwin and C.P. May in, Encyclopedia in Forensic Science, Volume 1, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000).
5. V.J. Geberth, Practical Homicide Investigation, CRC Press, Boca Raton (2006).
6. T. Bevel and R.M. Gardner, Bloodstain Pattern Analysis, 3rd Edition, CRC Press, Boca Raton (2008).
7. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2010).

1. Name of the Department: Forensic Sciences						
2. Course Name	Forensic Medicine Lab			**L**	**T**	**P**
3. Course Code	17040604			**0**	**0**	**4**
4. Type of Course (use tick mark)		Core (✓)	DSE ()	AEC ()	SEC ()	OE ()
5. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical = 52**		

8. Course Description:

In this laboratory course of Forensic Medicine, the student will be able to know about the basic knowledge of Death Investigations, Autopsy and Forensic Odontology.

9. Course Objectives:

1. To introduce the different types of autopsy
2. To examine different types of injuries
3. To identify and preserve bite marks
4. To assess the different type of sexual offences

10. Course Outcomes (COs):

The students will able to understand

1. The importance of ascertaining whether the crime was staged to appear as suicide or accident.
2. The protocol to deal with the media at the crime scene and also questionnaire for first responder at the crime scene.
3. Preservation methods of bite marks
4. Different types of sexual offences.

11. Unit wise detailed content

Practicals		

1. To observe post-mortem examination.
2. To study sexual assault examination protocol of the victim.
3. To study and examine various types of mechanical injuries.
4. To study and examine various types of chemical injuries.
5. To study and examine various types of burn injuries.
6. To design a protocol of media disclosure.
7. To a preserve and analyze bite marks.
8. To study and examine ligature marks.

12. Books recommended:

1. Lab Manual Of DFSS

1. Name of the Department: Forensic Sciences						
2. Course Name	Digital Forensics			**L**	**T**	**P**
3. Course Code	17040605			4	0	0
4. Type of Course (use tick mark)		**Core ( )**	**DSE(✓)**	**AEC ()**	**SEC ()**	**OE ()**
5. Pre-requisite (if any)	10+2 with Science stream	**6. Frequency (use tick marks)**	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		

8. Course Description:

This core paper in Forensic Sciences, the student will be able to know about the basic knowledge of the types of digital crimes, computer viruses and computer worm.

9. Course Objectives:

1. to identify the role of sectors and plotters in hard disk
2. To familiarize students with different types of cyber crime
3. To analyse the different parts of email
4. To understand the protocol for collection of cyber exhibits.

10. Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1. The basics of digital forensics.
2. The elements involved in investigation of digital crimes.
3. The types of digital crimes.
4. Understand the protocol for collection of cyber exhibits

11. Unit wise detailed content

Unit-1	**Number of lectures=13**	**Title of the unit:** Fundamentals and Concepts

Fundamentals of computers Hardware and accessories – development of hard disk, physical construction, CHS and LBA addressing, encoding methods and formats. Memory and processor. Methods of storing data. Operating system. Software. Introduction to network, LAN, WAN and MAN.

Unit – 2	**Number of lectures=13**	**Title of the unit:** Computer Crimes - I

Definition and types of computer crimes. Distinction between computer crimes and conventional crimes. Reasons for commission of computer crimes. Breaching security and operation of digital systems. Computer virus, and computer worm – Trojan horse, trap door, super zapping, logic bombs.

Unit – 3	**Number of lectures=13**	**Title of the unit:** Computer Crimes - II

Types of computer crimes – computer stalking, pornography, hacking, crimes related to intellectual property rights, computer terrorism, hate speech, private and national security in cyber space. An overview of hacking, spamming, phishing and stalking

Unit – 4	**Number of lectures=13**	**Title of the unit:** Computer Forensics Investigations

Seizure of suspected computer. Preparation required prior to seizure. Protocol to be taken at the scene. Extraction of information from the hard disk. Treatment of exhibits. Creating bitstream of the original media. Collection and seizure of magnetic media. Legal and privacy issues. Examining forensically sterile media. Restoration of deleted files. Password cracking and E-mail tracking. Encryption and decryption methods. Tracking users.

12. Brief Description of self learning / E-learning component

1. https://www.youtube.com/watch?v=ZUqzcQc_syE
2. https://www.youtube.com/watch?v=nMYapL6RQzU
3. https://www.youtube.com/watch?v=1z0ULvg_pW8
4. https://www.youtube.com/watch?v=bA8Z0mfa5xg
5. https://www.youtube.com/watch?v=a02vGdZ2Mog
6. https://www.youtube.com/watch?v=J2c3th4FY-w
7. https://www.youtube.com/watch?v=NmuhGa4QekU
8. https://www.youtube.com/watch?v=7cJMs8XCm0Y
9. https://www.youtube.com/watch?v=QQ9ZLlj36qs

13. Books Recommended

1. R.K. Tiwari, P.K. Sastry and K.V. Ravikumar, Computer Crimes and Computer Forensics, Select Publishers, New Delhi (2003).
2. C.B. Leshin, Internet Investigations in Criminal Justice, Prentice Hall, New Jersey (1997).
3. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).
4. E. Casey, Digital Evidence and Computer Crime, Academic Press, London (2000).

1. Name of the Department: Forensic Sciences						
2. Course Name	Digital Forensics Lab			**L**	**T**	**P**
3. Course Code	17040606			**0**	**0**	**4**
4. Type of Course (use tick mark)		**Core ()**	DSE (✓)	**AEC ()**	**SEC ()**	**OE ()**
5. Pre-requisite (if any)	10+2 with Science stream	**6. Frequency** (use tick marks)	Even (✓)	**Odd ()**	**Either Sem ()**	**Every Sem ()**
07. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical = 52**		

8. Course Description:

In this laboratory course of Digital Forensic, the student will be able to know about the basic knowledge of the types of digital crimes, computer viruses and computer worm.

9. Course Objectives:

1. To collect the digital evidence
2. To identify the IP address
3. To interpret role of encase software in analysis of digital exhibits
4. To acquire data from various digital sources

10. Course Outcomes (COs):

The students will able to –

1. Understand the elements involved in investigation of digital crimes.
2. **Detect** the deletions, obliterations and modifications of files using encase software.
3. Interpret role of encase software in analysis of digital exhibits
4. Acquire data from various digital sources

11. Unit wise detailed content

Practicals		

1. To identify, seize and preserve digital evidence from crime scenes.
2. To detect deletions, obliterations and modifications of files using encase software.
3. To trace routes followed by e-mails and chats.
4. To identify the IP address of the sender of e-mails.
5. To demonstrate concealment techniques using cryptographic PGP.
6. To identify encrypted files.
7. To identify hidden files.
8. To acquire data from PCs/laptops/HDDs/USBs, pen drives, memory cards and SIM cards.
9. To use symmetric and asymmetric keys for protection of digital record.
10. 11. To carry out imaging of hard disks.

12. Books Recommended

1. Lab Manuals of DFSS

1. Name of the Department: Forensic Sciences						
2. Course Name	DNA Forensics			**L**	**T**	**P**
3. Course Code	17040607			4	0	0
4. Type of Course (use tick mark)		Core ()	DSE (✓)	AEC ()	SEC ()	OE ()
5. Pre-requisite (if any)	10+2 with Science Stream	**6. Frequency (use tick marks)**	Even (✓)	Odd ()	Either Sem ()	Every Sem ()
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = 52		**Tutorials = Nil**		**Practical = Nil**		

8. Course Description:

This core paper in Forensic Sciences, the student will be able to know about the basic knowledge of Forensic DNA and its principles, genetic markers, Extraction of DNA for analysis

9. Course Objectives:

1. To understand the basics of DNA fingerprinting.
2. To discuss different methodologies used for DNA profiling
3. To define the role of PCR in DNA fingerprinting
4. To discriminate individuals based on DNA Profiling

10. Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

1. The basic principle of DNA analysis.
2. The importance of short tandem repeats and restriction fragment length polymorphism in DNA technique.
3. Role of DNA typing in parentage testing.
4. Discriminate individuals based on DNA Profiling

11. Unit wise detailed content

Unit-1	**Number of lectures=13**	**Title of the unit: Introduction to DNA Profiling**

Definition, Importance of DNA Fingerprinting in Forensic Science. Structure of DNA, RNA, Chromosome. Nuclear DNA and Mitochondria DNA

Unit-2	**Number of lectures=13**	**Title of the unit: Basic Principles**

DNA as biological blueprint of life. Extraction of DNA for analysis. Quantitation of DNA – yield gel quantitation and slot blot quantitation. sequence analysis.

Unit – 3	**Number of lectures=13**	**Title of the unit: Forensic DNA Typing**

Collection of specimens. Restriction fragment length polymorphism (RFLP) – genetic markers used in RFLP, typing procedure and interpretation of results.
Polymerase chain reaction – historical perspective, sequence polymorphisms, individualization of evidence. Short tandem repeats (STR) – role of fluorescent dyes, nature of STR loci. Touch DNA.

Unit – 4	**Number of lectures=13**	**Title of the unit: Parentage Testing**

Principles of heredity. Genetics of paternity. DNA testing in disputed paternity. Mendelian laws of parentage testing. Mathematical basis of parentage identification. Missing body cases. Reference populations and databases. Role of DNA typing in identifying unrecognizable bodies. Allele frequency determination.

12. Brief Description of self learning / E-learning component

1 https://www.youtube.com/watch?v=YqWfFGEXVJA
2 https://www.youtube.com/watch?v=gmNw6CWtN. 5k
3 https://www.youtube.com/watch?v=gG7uCskUOrA

4 https://www.youtube.com/watch?v=6l_8-FEQfgc
5 https://www.youtube.com/watch?v=nBiE6aiHRok
6 https://www.youtube.com/watch?v=eEUvRrhmcxM
7 https://www.youtube.com/watch?v=l-0r2xlTfbI
8 https://www.youtube.com/watch?v=m211k0wbNFw
9 https://www.youtube.com/watch?v=rIBFMS0pciA

13. Books Recommended

1. J.M. Butler, Forensic DNA Typing, Elsevier, Burlington (2005).
2. K. Inman and N. Rudin, An Introduction to Forensic DNA Analysis, CRC Press, Boca Raton (1997).
3. H. Coleman and E. Swenson, DNA in the Courtroom: A Trial Watcher's Guide, GeneLex Corporation, Washington (1994).
4. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2010).

1. Name of the Department: Forensic Sciences						
2. Course Name	DNA Forensics Lab			**L**	**T**	**P**
3. Course Code	17040608			**0**	**0**	**4**
4. Type of Course (use tick mark)		**Core ()**	**DSE (✓)**	**AEC ()**	**SEC ()**	**OE ()**
5. Pre-requisite (if any)	10+2 with Science stream	**6. Frequency (use tick marks)**	**Even (✓)**	**Odd ()**	**Either Sem ()**	**Every Sem ()**
7. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical = 52**		

8. Course Description:

In this laboratory course of Digital Forensic, the student will be able to know about the basic knowledge of Forensic DNA and its principles, genetic markers, Extraction of DNA for analysis

9. Course Objectives:

1. To determine the role of TLC for biological exhibits.
2. To identify and extract DNA from different exhibits
3. To understand the role and principle of electrophoresis
4. To enumerate differentiating features of report writing .

10. Course Outcomes (COs):

The students will able to –

1. The forensic significance of DNA typing.
2. Carry out the separation and extraction of DNA from body fluids
3. Understand the role and principle of electrophoresis
4. Enumerate differentiating features of report writing

11. Unit wise detailed content

Practicals

1. To carry out the separation of amino acids by thin layer chromatography.
2. To carry out extraction of DNA from blood using FTA cards.
3. To carry out extraction of DNA from blood using organic extraction methods.
4. To carry out extraction of DNA from other body fluids.
5. To estimate the quantity of DNA using UV-Spectrophotometer.
6. To preparation of gel plates for electrophoresis.
7. To carry out electrophoresis for separation of enzymes.
8. To prepare a report on the role of DNA typing in solving paternity disputes.

12. Books Recommended

1. Lab Manuals of DFSS

01. Name of the Department: Forensic Sciences						
02. Course Name	Dissertation			**L**	**T**	**P**
03. Course Code	17040609			**0**	**0**	**6**
04. Type of Course (use tick mark)		**Core ()**	DSE (✓)	**AEC ()**	**SEC ()**	**OE ()**
05. Pre-requisite (if any)		**6. Frequency (use tick marks)**	Even (✓)	**Odd ()**	**Either Sem ()**	**Every Sem ()**
07. Total Number of Lectures, Tutorials, Practicals						
Lectures = Nil		**Tutorials = Nil**		**Practical = 6**		

8. Course Description:

In the dissertation project, the student will be choosing a topic of their interest in related area of forensic science. This will provide the students an opportunity to demonstrate the ability to apply their skills of data collection, hypothesis formulation, data analysis & research writing in a structured form.

9. Course Objectives:

1. To explore the research opportunities in the related field
2. To understand the concept of hypothesis formulation & research writing
3. To gain knowledge of research project designing
4. To learn the parameters of academic research writing

10.Course Outcomes (COs):

1. Students would be able to know the designing of the research project and its presentation.
2. They would be able to understand the issues in the related field & to create the hypothesis as per the problem discussed
3. They would be able to learn the significance of review of literature in research area.
4. Student would be able to learn the concept of sample collection,sample criteria & sample analysis.

11. Unit wise detailed content

The dissertation will be based on a research topic in Forensic Science and related areas. The topic will be assigned in consultation with police and forensic science establishments, giving due consideration to the problem areas faced by these institutions. The students will be expected to undertake extensive field work, in collaboration with mobile police laboratories.

Note:

The syllabus to be revised and updated every two years based upon the Academic, Industrial and Scientific needs.