List of New Course(s) Introduced

Department : Forensic Science

Programme Name : B.Sc. Forensic Science (4 Year NEP)

Academic Year : 2023-2024

List of New Course(s) Introduced

Sr. No.	Course Code	Name of the Course
01.	FSUAMJT1	Introduction to Forensic Science
02.	FSUAMJL1	Practical's based on Introduction to Forensic Science
03.	FSUAMNT1	Introduction to Forensic Science
04.	FSUAMNL1	Practical's based on Introduction to Forensic Science
05.	FSUASET1	Handwriting Identification and Recognition
06.	FSUBMJT1	Crime and Law
07.	FSUBMJL1	Practical's based on Crime and Law
08.	FSUBMJT1	Crime and Law
09.	FSUBMJL1	Practical's based on Crime and Law
10.	FSUBSET1	Forensic Radiology
11.	FSUCMJT1	Technological Methods in Forensic Science
12.	FSUCMJL1	Technological Methods in Forensic Science-Lab
13.	FSUCMJT2	Crime scene Management
14.	FSUCMJL2	Crime scene Management-Lab
15.	FSUCMNT2	Crime scene Management
16.	FSUCMNL2	Crime scene Management-Lab
17.	FSUCSET1	Wildlife Forensic
18.	FSUDMJT1	Dermatoglyphics
19.	FSUDMLT1	Dermatoglyphics-Lab
20.	FSUDMJT2	Forensic Biology and Serology
21.	FSUDMLT2	Forensic Biology and Serology-Lab
22.	FSUDMJT3	Forensic Chemistry and Toxicology
23.	FSUDMLT3	Forensic Chemistry and Toxicology-Lab
24.	FSUDMNT1	Forensic Biology and Serology
25.	FSUDMNL1	Forensic Biology and Serology-Lab
26.	FSUEMJT1	Questioned Documents
27.	FSUEMLT1	Questioned Documents-Lab

28.	FSUEMJT2	Forensic Anthropology
29.	FSUEMJL2	Forensic Anthropology-Lab
30.	FSUEMJT3	Digital and Cyber Forensics
31.	FSUEMJL3	Digital and Cyber Forensics-Lab
32.	FSUEMNT1	Forensic Anthropology
33.	FSUEMNL1	Forensic Anthropology-Lab
34.	FSUEST1	Internship
35.	FSUFMJT1	Forensic Ballistics and Physics
36.	FSUFMJLT1	Forensic Ballistics and Physics-Lab
37.	FSUFMJT2	Forensic Molecular Biology
38.	FSUFMJLT2	Forensic Molecular Biology-Lab
39.	FSUFMJT3	Forensic Medicine
40.	FSUFMJLT3	Forensic Medicine-Lab
41.	FSUFMNT1	Forensic Ballistics and Physics
42.	FSUFMNT1	Forensic Ballistics and Physics-Lab
43.	FSUGMJT1	Biometrics- Tool for personal Identification in Forensic Science
44.	FSUGMJL1	Biometrics- Tool for personal Identification in Forensic Science-Lab
45.	FSUGTD1	Forensic DNA Typing and Profiling
46.	FSUGLD1	Forensic DNA Typing and Profiling-Lab
47.	FSUGTD2	Advanced Forensic Serology and Immunology
48.	FSUGLD2	Advanced Forensic Serology and Immunology-Lab
49.	FSUGTD3	Advanced Forensic Toxicology
50.	FSUGLD3	Advanced Forensic Toxicology-Lab
51.	FSUGMJT2	Research Methodology and Publication Ethics
52.	FSUGST1	Seminar
53.	FSUHMJT1	Advanced Technological Methods in Forensic Science
54.	FSUHMJL1	Advanced Technological Methods in Forensic Science
55.	FSUHMNT1	Advanced Technological Methods in Forensic Science
56.	FSUHMNL1	Advanced Technological Methods in Forensic Science
57.	FSUHDT1	Dissertation
58.	FSUHMJT1	Forensic Psychology and Criminology
59.	FSUHMJL1	Forensic Psychology and Criminology
60.	FSUHMNT1	Forensic Psychology and Criminology
61.	FSUHMNL1	Forensic Psychology and Criminology
62.	FSUHST1	Seminar

63.	MDCFS01	Crime against women
64.	MDCFS02	Cyber Crime
65.	VACFS01	Forensic Science and Society
66.	VACFS02	Criminal Law and Police Science

Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year : 2023-24

School : School of Studies of Interdisciplinary Education and Research

Department : Forensic Science

Date and Time : 25-09-2023 03:00 PM

Venue : Department of Forensic Science

The scheduled meeting of member of Board of Studies (BoS) of Department of Forensic Science, School of Studies of Interdisciplinary Education and Research, Guru Ghasidas Vishwavidyalaya, Bilaspur was held to design and discuss the B.Sc. Forensic Science (4 Year NEP) scheme and syllabi.

The following members were present in the meeting:

1. Prof. Naveen Vishwakarma — Chairman BOS & Head (In-charge)
2. Dr. Manoj Kumar Pathak — Member & Subject Expert BOS (Online)
3. Dr. Ajay Amit — Member BOS
4. Dr. Sudhir Yadav — Invited Member
5. Dr. Chanchal Kumar — Invited Member
6. Miss. Blessi N. Uikey — Invited Member

The industrial expert member Dr. Sunanda Dhenge was absent due to the medical reason.
The Head of the department welcomed all the members. Thereafter, the following agendawere taken up:
Agenda: To discuss framework and syllabus of undergraduate four year course of Forensic Science as per NEP 2020.
Resolution: The committee has discussed and approved the framework and syllabus of undergraduate four year course of Forensic Science as per NEP 2020.

The meeting was ended with the formal vote of thanks proposed by the Head of the department.

Signature & Seal of HoD

Scheme and Syllabus

Department of Forensic science

Guru Ghasidas Vishwavidyalaya

UG (4year NEP) course

Scheme of examination

The credit of the courses given in the following table:

Course	Credits distribution Theory + Practical/Tutorial (L+P+T or L+P or L+T)	
	B.Sc (Honours with research)	**B.Sc (Honours)**
I. Major Course Theory (17/18 Papers) Practical / Tutorial (17/18 Papers)	17 x 3 = 51 5 x 1 = 05 11 x =22 Total 80	18 x 3 = 54 5 x 1 = 05 13 x 2 =26 Total 85
II. Minor Courses (including 12 credits vocational)	32	37
III. Multidisciplinary courses	9	9
IV. Ability Enhancement Courses	8	8
V. Skill Enhancement Courses	9	9
VI. Value added courses	8	8
VII. Internship	2	2
VIII. Research Project/Seminar	Research Project/Dissertation of 12 Credits	Seminar 02 Credits
Total Credit	**160**	**160**

Department of Forensic Science,

Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G

4- year UG Programme B.Sc. Forensic Science (NEP)

STRUCTURE OF COURSES

Semester	Courses	Number of courses	Level	Credits	Name of Course	Total Credits
I	Major	1	2	4	Introduction to Forensic science (L=3; P=1)	20
	Minor	1	2	4	Introduction to Forensic science (L=3; P=1)	
	Multidisciplinary	1	1	3	To be offered by university from a basket of courses	
	AEC	1	1	2	To be offered by university from a basket of courses	
	SEC	1	1	3	Handwriting Identification and recognition (L=3; P=0)	
	VAC	2	1	2 + 2	To be offered by university from a basket of courses	
II	Major	1	2	4	Crime and Law (L=3, T=1)	20
	Minor	1	2	4	Crime and Law (L=3; T=1)	
	Multidisciplinary	1	1	3	To be offered by university from a basket of courses	
	AEC	1	1	2	To be offered by university from a basket of courses	
	SEC	1	1	3	Forensic Radiology (L=3; P=0)	
	VAC	2	1	2 + 2	To be offered by university from a basket of courses	
The student must complete the 4 credit vocational course/Internship during summer term to get B.Sc. Certificate if he wish to exit the program after first 2 semesters.						
	Major	2	3	8	Technological Methods in	

III					Forensic Science(L=3;P=1)	20
					Crime scene Management (L=3; P=1)	
	Minor	1	3	4	Crime scene Management (L=3; P=1)	
	Multidisciplinary	1	1	3	To be offered by university from a basket of courses	
	AEC	1	1	2	To be offered by university	
	SEC	1	1	3	Wildlife Forensic (L=3; P=0)	
IV	Major	3	3	14	Dermatoglyphics (L=3; P=2)	20
					Forensic Biology and Serology (L=3; P=2)	
					Forensic Chemistry and Toxicology (L=3; P=1)	
	Minor	1	3	4	Forensic Biology and Serology (L=3; P=1)	
	AEC	1	1	2	To be offered by university	
The student must complete the 4-credit vocational course/Internship either after first year or second year during summer term to get B.Sc. Diploma if he wish to exit the program after first 4 semesters.						
V	Major	3	4	15	Questioned Documents (L=3; P=2)	21
					Forensic Anthropology (L=3; P=2)	
					Digital and Cyber Forensics (L=3; P=2)	
	Minor	1	4	4	Forensic Anthropology (L=3; P=1)	
	Internship	-	-	2	Internship	
VI	Major	3	4	15	Forensic Ballistics and Physics (L=3; P=2)	19
					Forensic Molecular Biology (L=3; P=2)	
					Forensic Medicine (L=3; P=2)	
	Minor	1	4	4	Forensic Ballistics and Physics (L=3; P=1)	

The students wish to exit after six semester upon securing 120 credits will be awarded B.Sc. degree in relevant subject/discipline						
After sixth semester, there will be two steams: (I) B.Sc. (Honours with research) and (II) B.Sc. (Honours). The students who will secure 75% and above may opt for B.Sc. (Honours with research).						
(I) Course structure for B.Sc. (Honours with research)						
VII	Major	3	5	15	Biometrics- Tool for personal Identification in Forensic science (L=3; P=2)	19
					a) Forensic DNA Typing and Profiling (L=3; P=2) b) Advanced Forensic Serology and Immunology (L=3; P=2) c) Advanced Forensic Toxicology (L=3; P=2)	
					Research Methodology and Publication Ethics (L=5)	
	Minor	1	5	4	Biometrics as Tool for personal Identification in Forensic science (L=3; P=1)	
VIII	Major	1	5	5	Advanced Technological Methods in Forensic Science (L=3; P=2)	21
	Minor	1	5	4	Advanced Technological Methods in Forensic Science (L=3; T=1)	
	Research project/dissertation	-	-	12	Dissertation	
(II) Course structure for the B.Sc. (Honours)						
VII	Major	3	5	15	Biometrics as Tool for personal Identification in Forensic science (L=3; P=2)	20
					a) Forensic DNA Typing and Profiling (L=3; P=2) b) Advanced Forensic	

					Serology and Immunology (L=3; P=2) c) Advanced Forensic Toxicology (L=3; P=2)	
					Research Methodology and Publication Ethics (L=3, T=2)	
	Minor	1	5	4	Biometrics as Tool for personal Identification in Forensic science (L=3; P=1)	
	Seminar	-	-	1	Seminar	
VIII	Major	2	5	10	Advanced Technological Methods in Forensic Science (L=3; P=2)	20
					Forensic Psychology and Criminology (L=3; P=2)	
	Minor	2	5	8	Advanced Technological Methods in Forensic Science (L=4;)	
					Forensic Psychology and Criminology (L=3; P=1)	
	Seminar	-	-	2	Seminar	

Four Year UG in Forensic Science

Semester-I

Major-I (Paper Code)

Introduction to forensic Science

Unit 1: History and Development of Forensic Science in India

History and development of forensic science. Functions of forensic science. Nature and scope of Forensic science. Definitions and concepts in forensic science. Scope of forensic science. Need of forensic science. Basic principles of forensic science. Frye case and Daubertstandard.

Unit 2: Tools and Techniques in Forensic Science

Branches of forensic science. Forensic science in international perspectives, including set up of INTERPOL and FBI, RAW and CBI. Duties of forensic scientists. Ethics in forensic science. Code of conduct for forensic scientists. Qualifications of forensic scientists. Data depiction. Report writing. Expert testimony.

Unit 3: Organizational set up of Forensic Science Laboratories in India

Hierarchical set up of Central Forensic Science Laboratories, State Forensic Science Laboratories, Government Examiners of Questioned Documents, Fingerprint Bureaus, National Crime Records Bureau, Police & Detective Training Schools, Bureau of Police Research & Development, Directorate of Forensic Science and Mobile Crime Laboratories.

Unit 4: Police Science

Definition and scope, Organizational set up of Police at State, Range and District level. State armed forces and home guards. Role of Police in crime investigations. State criminal investigation departments, FIR, Police dogs. Services of crime laboratories. Basic servicesand optional services.

Suggested Readings

1. B.B. Nanda and R.K. Tiwari, Forensic Science in India: A Vision for the Twenty FirstCentury, Select Publishers, New Delhi (2001).

2. M.K. Bhasin and S. Nath, Role of Forensic Science in the New Millennium, University ofDelhi, Delhi (2002).

3. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific and Investigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005).

4. W.G. Eckert and R.K. Wright in Introduction to Forensic Sciences, 2nd Edition, W.G.Eckert (ED.), CRC Press, Boca Raton (1997).

5. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).

6. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013).

Four Year UG in Forensic Science

Semester-I

Major-I (Paper Code)

Practical's Based on Introduction to forensic Science

Practical

1. To study the history of crime cases from 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 National Crime Records Bureau and depict the data ondifferent type of crime cases by way of smart art/templates.
5. To write report on different type of crime cases.
6. To review how the Central Fingerprint Bureau, New Delhi, coordinates the working ofState Fingerprint Bureaus.
7. To examine the hierarchical set up of different forensic science establishments and suggestimprovements.
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 forensicscientists.

Learning Outcome: After studying this paper the students will know:

The significance of forensic science to human society.
The fundamental principles and functions of forensic science.
The divisions in a forensic science laboratory.
The working of the forensic establishments in India and abroad.

Four Year UG in Forensic Science

Semester-I

Minor -I (Paper Code)

Introduction to forensic Science

Unit 1: History and Development of Forensic Science in India

History and development of forensic science. Functions of forensic science. Nature and scope of Forensic science. Definitions and concepts in forensic science. Scope of forensic science. Need of forensic science. Basic principles of forensic science. Frye case and Daubertstandard.

Unit 2: Tools and Techniques in Forensic Science

Branches of forensic science. Forensic science in international perspectives, including set up of INTERPOL and FBI, RAW and CBI. Duties of forensic scientists. Ethics in forensic science. Code of conduct for forensic scientists. Qualifications of forensic scientists. Data depiction. Report writing. Expert testimony.

Unit 3: Organizational set up of Forensic Science Laboratories in India

Hierarchical set up of Central Forensic Science Laboratories, State Forensic Science Laboratories, Government Examiners of Questioned Documents, Fingerprint Bureaus, National Crime Records Bureau, Police & Detective Training Schools, Bureau of Police Research & Development, Directorate of Forensic Science and Mobile Crime Laboratories.

Unit 4: Police Science

Definition and scope, Organizational set up of Police at State, Range and District level. State armed forces and home guards. Role of Police in crime investigations. State criminal investigation departments, FIR, Police dogs. Services of crime laboratories. Basic servicesand optional services.

Suggested Readings

7. B.B. Nanda and R.K. Tiwari, Forensic Science in India: A Vision for the Twenty FirstCentury, Select Publishers, New Delhi (2001).

8. M.K. Bhasin and S. Nath, Role of Forensic Science in the New Millennium, University ofDelhi, Delhi (2002).

9. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific and Investigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005).

10. W.G. Eckert and R.K. Wright in Introduction to Forensic Sciences, 2nd Edition, W.G.Eckert (ED.), CRC Press, Boca Raton (1997).

11. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).

12. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013).

Four Year UG in Forensic Science

Semester-I

Minor-I (Paper Code)

Practical's Based on Introduction to forensic Science

Practical

11. To study the history of crime cases from forensic science perspective.
12. To cite examples of crime cases in which apprehensions arose because of Daubert standards.
13. 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.
14. To study the annual reports of National Crime Records Bureau and depict the data ondifferent type of crime cases by way of smart art/templates.
15. To write report on different type of crime cases.
16. To review how the Central Fingerprint Bureau, New Delhi, coordinates the working ofState Fingerprint Bureaus.
17. To examine the hierarchical set up of different forensic science establishments and suggestimprovements.
18. 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.
19. To compare and contrast the role of a Police Academy and a Police Training School.
20. To compare the code of conduct prescribed by different establishments for forensicscientists.

Learning Outcome: After studying this paper the students will know:

The significance of forensic science to human society.
The fundamental principles and functions of forensic science.
The divisions in a forensic science laboratory.
The working of the forensic establishments in India and abroad.

Four Year UG in Forensic Science

Semester-I

SEC I - Skill Enhancement Course (Paper Code)

Handwriting Identification and Recognition

Unit 1: 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: Handwriting Examination

Basis of handwriting comparison, Collection of handwriting samples, Forgery detection, Counterfeiting, Examination of altered and erased documents. Tools used in handwritingexamination.

Unit 3: Handwriting Recognition

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

Unit 4: Basic tools for examination of Documents

Application of basic tools for the examination of Questioned Document, Ultraviolet, Visible and Fluorescence Spectroscopy. Photomicrography, Video Spectral Comparator, ElectrostaticDetection Apparatus.

Suggested Readings:

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 Civiland Criminal Cases, 4th Edition, Foundation Press, New York (1995)
3. Albert S. Osborn; Questioned Documents, 2nd Edition, Universal Law Pub., Delhi.
4. Wilson R. Harrison; Suspected Documents and their Scientific Examination.
5. Saferestein, Criminalistics: An Introduction to Forensic Science. Prentice, Hall.
6. Sharma, B.R.: Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad, 1974.

Learning Objectives: After studying this paper the students will know

The importance of examining questioned documents in criminal cases.
The tools required for examination of questioned documents.
The significance of comparing handwriting samples.
The importance of detecting frauds and forgeries by analyzing questioned documents.

Four Year UG in Forensic Science

Semester-II

Major -I (Paper Code)

Crime and Law

Unit 1: Basics of Criminology

Criminology: Definition, aims, nature and scope, Concept of Crime, Brief Introduction of Theories of criminal behavior such as classical, positivist, sociological etc.; Criminal profiling, Understanding *Corpus delicti* and Modus *operandi*. Crime: Elements, nature, causations and consequences of crime, Classification of crime and criminals, Deviant behavior, public disorders, domestic violence and workplace violence, Psychological Disorders and Criminality.

Unit 2: Recent Advancements in Crimes

Brief Introduction towards: Victimology, Juvenile delinquency, Hate crimes, Organized crimes, Situational crime, Economic crime, Sexual Offences, Crime due to intoxication, Cybercrimes and White-collar crimes, Modern Approaches towards Investigative strategy and Role of Media in the solution of crime. Broad Components of criminal justice system, Correctional measures and rehabilitation of offenders, Human rights and criminal justice system in India.

Unit 3: Law to Combat Crime

Introduction towards Indian Penal Code, Criminal Procedure Code and Indian Evidence Act, Relevant sections of IPC pertaining to offences against persons, property, Cr.P.C, IEA and their Amendments. Preamble, Fundamental Rights, Directive Principles of State Policy– Articles 14, 15, 20, 21,22, 51A, summary trial-Section 260 (2) and Judgments in abridged forms-Section 355.

Unit 2: Acts Pertaining to Socio-economic and Environmental Crimes

Classification of cases, Types of offences, Essential elements of criminal law, Constitution and hierarchy of criminal courts, Legal procedure pertaining to expert witness testimony, Expert witness. Narcotic, Drugs and Psychotropic Substances (NDPS) 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 2000, Environment Protection Act, Untouchability Offences Act.

Suggested Readings:

1. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific and Investigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005).

2. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey(2004).

3. J.L. Jackson and E. Barkley, Offender Profiling: Theory, Research and Practice,Wiley,Chichester(1997).

4. R. Gupta, Sexual Harassment at Workplace, LexisNexis, Gurgaon(2014).

5. Paranjape, N.V. Criminology and Penology, Central Law Publication, Allahabad.

6. William Bailey,The Encyclopedia of Police Science, Second Edition Garland publishing,INC, London.

7. Suderland,E.Hand Donald R. Cressy; The Principals of Criminology, The Times of IndiaPress, Bombay,1968

8. Ahuja,Ram Criminology, Rawat Publication, Jaipur

9. Wayne Petherick, Brent Turvey, Claire Ferguson, Forensic Criminology, Academic PressDonald, J. (1992), The Police Photographer's Guide, Photo Test Books, Arlington Heights.

Four Year UG in Forensic Science

Semester-II

Major-I (Paper Code)

Practical's based on Crime and Law

Practical

1. To review past criminal cases and elucidate which theory best explains the criminalbehaviour of the accused.
2. To review crime cases where criminal profiling assisted the police to apprehend theaccused.
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 behaviour 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.
8. To review the recommendations on modernization of police stations and evaluate how farthese have been carried out in different police stations.
9. To visit a 'Model Police Station' and examine the amenities vis-à-vis conventional policestations.
10. To examine steps being taken for rehabilitation of former convicts and suggestsimprovements.
11. To prepare a report on interrogation cells and suggest improvements.

Learning Outcomes: After studying this paper the students will know:

a. The importance of criminology.
b. The causes of criminal behavior.
c. The significance of criminal profiling to mitigate crime.
d. The various criminal law and its uses.
e. The elements of criminal justice system.

Four Year UG in Forensic Science

Semester-II

Minor -I (Paper Code)

Crime and Law

Unit 1: Basics of Criminology

Criminology: Definition, aims, nature and scope, Concept of Crime, Brief Introduction of Theories of criminal behavior such as classical, positivist, sociological etc.; Criminal profiling, Understanding *Corpus delicti* and Modus *operandi*. Crime: Elements, nature, causations and consequences of crime, Classification of crime and criminals, Deviant behavior, public disorders, domestic violence and workplace violence, Psychological Disorders and Criminality.

Unit 2: Recent Advancements in Crimes

Brief Introduction towards: Victimology, Juvenile delinquency, Hate crimes, Organized crimes, Situational crime, Economic crime, Sexual Offences, Crime due to intoxication, Cybercrimes and White-collar crimes, Modern Approaches towards Investigative strategy and Role of Media in the solution of crime. Broad Components of criminal justice system, Policing styles and principles, Correctional measures and rehabilitation of offenders, Human rights and criminal justice system in India.

Unit 3: Law to Combat Crime

Introduction towards Indian Penal Code, Criminal Procedure Code and Indian Evidence Act, Relevant sections of IPC pertaining to offences against persons, property, Cr.P.C, IEA and their Amendments. Preamble, Fundamental Rights, Directive Principles of State Policy– Articles 14, 15, 20, 21,22, 51A, summary trial-Section 260 (2) and Judgments in abridged forms-Section 355.

Unit 2: Acts Pertaining to Socio-economic and Environmental Crimes

Classification of cases, Types of offences, Essential elements of criminal law, Constitution and hierarchy of criminal courts, Legal procedure pertaining to expert witness testimony, Expert witness. Narcotic, Drugs and Psychotropic Substances (NDPS) 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 2000, Environment Protection Act, Untouchability Offences Act.

Suggested Readings:

10. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific and Investigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005).

11. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey(2004).

12. J.L. Jackson and E. Barkley, Offender Profiling: Theory, Research and Practice, Wiley,Chichester(1997).

13. R. Gupta, Sexual Harassment at Workplace, LexisNexis, Gurgaon(2014).

14. Paranjape, N.V. Criminology and Penology, Central Law Publication, Allahabad.

15. William Bailey, The Encyclopedia of Police Science, Second Edition Garland publishing,INC, London.

16. Suderland,E.Hand Donald R. Cressy; The Principals of Criminology, The Times of IndiaPress, Bombay,1968

16. Ahuja, Ram Criminology, Rawat Publication, Jaipur

17. Wayne Petherick, Brent Turvey, Claire Ferguson, Forensic Criminology, Academic PressDonald, J. (1992), The Police Photographer's Guide, Photo Test Books, Arlington Heights.

Four Year UG in Forensic Science

Semester-II

Minor -I (Paper Code)

Practical's based on Crime and Law

Practical

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 theaccused.
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.
8. To review the recommendations on modernization of police stations and evaluate how far these have been carried out in different police stations.
9. To visit a 'Model Police Station' and examine the amenities vis-à-vis conventional police stations.
10. To examine steps being taken for rehabilitation of former convicts and suggests improvements.
11. To prepare a report on interrogation cells and suggest improvements.

Learning Outcomes: After studying this paper the students will know:

a. The importance of criminology.
b. The causes of criminal behavior.
c. The significance of criminal profiling to mitigate crime.
d. The various criminal law and its uses.
e. The elements of criminal justice system.

Four Year UG in Forensic Science

Semester-III

Major -I (Paper Code)

Technological methods in Forensic Science

Unit1: Instrumentation

Sample preparation for chromatographic and spectroscopic evidence. Measurement of pH, Concept of buffer solution preparation and its application in various forensic analysis methods. Chromatographic methods. Fundamental principles and forensic applications of thin layer chromatography, Paper chromatography, Gas chromatography and liquid chromatography including High Performance liquid Chromatography (HPLC), Affinity Chromatography, Gel Exclusion Chromatography, Ion Exchange Chromatography.

Unit 2: Spectroscopic methods

Fundamental principles and forensic applications of Ultraviolet-visible spectroscopy, infrared spectroscopy, atomic absorption spectroscopy, atomic emission spectroscopy and mass spectroscopy. X-ray spectrometry. Colorimetric analysis and Lambert-Beer law. Neutron activation analysis – fundamental principles and forensic applications.

Unit 3: Microscopy and Centrifugation

Fundamental principles of Microscopy. Different types of microscopes including light microscope, Polarization microscope, Comparison Microscope. Electron microscope- Scanning Electron Microscope (SEM) and Transmission Microscope (TEM), Forensic applications of microscopy. Principle of Sedimentation, Types of Centrifuges- Preparative centrifuges including Differential centrifuge, Density Gradient Centrifuge, Clinical Centrifuges.

Unit 4: Methods in DNA Forensics

DNA isolation from various sources (Semen, Blood, Saliva, Hair etc.), Electrophoresis- fundamental principles of Agarose Gel, SDS PAGE (Native and Denaturing) and its forensic applications. Genome content and its analysis. Repetitive and Non repetitive DNA and its application in DNA forensics.

Suggested Readings:

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).

Four Year UG in Forensic Science

Semester-III

Major -I (Paper Code)

Practical's Based on Technological methods in Forensic Science

Practical

1. Measurement of pH and preparation of Buffers of various pH.
2. DNA isolation from body fluid.
3. Perform the Agarose Gel Electrophoresis for separation of forensic DNA sample.
4. To determine the concentration of a colored compound by colorimetry analysis.
5. To carry out thin layer chromatography of ink samples.
6. To carry out separation of organic compounds by paper chromatography.
7. To identify drug samples using UV-Visible spectroscopy.
8. Preparation of Gel exclusion column and analysis of proteins.

Learning Outcomes: After studying this paper the students will know –

a. The importance of chromatographic and spectroscopic techniques in processing crime scene evidence.

b. The utility of colorimetry, electrophoresis and neutron activation analysis in identifying chemical and biological materials.

c. The significance of microscopy in visualizing trace evidence and comparing it with control samples.

Four Year UG in Forensic Science

Semester-III

Major -II (Paper Code)

Crime Scene Management

Unit 1: Crime Scene Management

Types of crime scenes – indoor and outdoor. Securing and isolating the crime scene. 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 1H (how?). Crime scene logs.

Unit 2: Crime Scene Evidence

Classification of crime scene evidence – physical and trace evidence. Lockard's principle. Collection, labelling, sealing of evidence. Hazardous evidence. Preservation of evidence. Chain of custody. Reconstruction of crime scene. Nature of Examination of Physical Evidences (Instrumental and Chemical).

Unit 3: Physical 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. Cloth evidence- importance, location, collection and comparison of cloth samples. Forensic gemology.

Unit 4: Trace Evidences

Fiber evidence – artificial and man-made fibers. Collection of fiber evidence. Identification and comparison of fibers. Soil evidence – importance, location, collection and comparison of soil samples. Hair 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.

Suggested Readings

1. A.J. Barry, Techniques of Crime Scene Investigation, 6th Edition Ed, CRC Press NY(2003).
2. M. Byrd, Crime Scene Evidence: A Guide to the Recovery and Collection of PhysicalEvidence, CRC Press, Boca Raton (2001).
3. P.L Kirk, Criminal Investigation, Inter Science Publisher Inc, New York.
4. Richard Saferestein, Criminalistics: An Introduction to Forensic Science Hall INC, USA.
5. S. Goutam and M.P. Goutam. Physical Evidences- Introduction & Bibliography on theirForensic Analysis. Shiv Shakti Book Traders, New Delhi.
6. S.H. James and J.J. Nordby. Forensic Science: An Introduction to Scientific and Investigative Techniques, CRC Press, USA.
7. T.J. Gardener and T.M. Anderson, Criminal Evidence, 4th Ed., Wadsworth, Belmont(2001).
8. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013).

Four Year UG in Forensic Science

Semester-III

Major -II (Paper Code)

Practical's Based Crime Scene Management

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.

Learning Objectives: After studying this paper the students will know –

a. The methods of securing, searching and documenting crime scenes.

b. The art of collecting, packaging and preserving different types of physical and traceevidence at crime scenes.

c. The legal importance of chain of custody.

d. The tools and techniques for analysis of different types of crime scene evidence.

Four Year UG in Forensic Science

Semester-III

Minor -I (Paper Code)

Crime Scene Management

Unit 1: Crime Scene Management

Types of crime scenes – indoor and outdoor. Securing and isolating the crime scene. 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 1H (how?). Crime scene logs.

Unit 2: Crime Scene Evidence

Classification of crime scene evidence – physical and trace evidence. Lockard's principle. Collection, labelling, sealing of evidence. Hazardous evidence. Preservation of evidence. Chain of custody. Reconstruction of crime scene. Nature of Examination of Physical Evidences (Instrumental and Chemical).

Unit 3: Physical 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. Cloth evidence- importance, location, collection and comparison of cloth samples. Forensic gemology.

Unit 4: Trace Evidences

Fiber evidence – artificial and man-made fibers. Collection of fiber evidence. Identification and comparison of fibers. Soil evidence – importance, location, collection and comparison of soil samples. Hair 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.

Suggested Readings

9. A.J. Barry, Techniques of Crime Scene Investigation, 6th Edition Ed, CRC Press NY(2003).

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

11. P.L Kirk, Criminal Investigation, Inter Science Publisher Inc, New York.

12. Richard Saferestein, Criminalistics: An Introduction to Forensic Science Hall INC, USA.

13. S. Goutam and M.P. Goutam. Physical Evidences- Introduction & Bibliography on theirForensic Analysis. Shiv Shakti Book Traders, New Delhi.

14. S.H. James and J.J. Nordby. Forensic Science: An Introduction to Scientific and Investigative Techniques, CRC Press, USA.

15. T.J. Gardener and T.M. Anderson, Criminal Evidence, 4th Ed., Wadsworth, Belmont(2001).

16. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013).

Four Year UG in Forensic Science

Semester-III

Minor -I (Paper Code)

Practical's Based Crime Scene Management

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.

Learning Objectives: After studying this paper the students will know –

a. The methods of securing, searching and documenting crime scenes.
b. The art of collecting, packaging and preserving different types of physical and trace evidence at crime scenes.
c. The legal importance of chain of custody.
d. The tools and techniques for analysis of different types of crime scene evidence.

Four Year UG in Forensic Science

Semester-III

Skill Enhancement course -I (Paper Code)

Wildlife Forensic

Unit I: Introduction to Wildlife Forensics

Introduction and importance of wildlife, Protected and Endangered species of animals and plants, Sanctuaries and their importance, Wildlife crime case studies.

Unit 2: Wildlife Crimes and its Investigation

Introduction to Wildlife Crimes and its types, Investigation of a wildlife crime scene, Different methods of killing and poaching of wildlife animals, Techniques of Species identification.

Unit 3: Wildlife Crime Evidence

Illegal wildlife trade, Identification techniques for wildlife evidences encountered at crime scene, Identification of pug marks of different animals, various forensic protocols for species identification, Molecular markers used in wildlife forensics; Wildlife Protection Act, 1972.

Unit 4: Wildlife Conservation Agencies

Introduction to Wildlife conservation agencies-WWF, IUCN, CITES, WCCB, Wildlife conservation society, Defenders of Wildlife, Big lite Foundation, International fund for Animal welfare, National wildlife federation, Red Data Book.

Suggested Readings:

Huffman J.E. & Wallace J.R. (2012). Wildlife Forensics: Methods and Applications. USA, John Wiley & Sons

Hosetti, B.B; "Concept in Wildlife Management", Daya Publishing House,2005.

Linarce, Adrian; "Forensic Science in Wildlife Investigation", CRC Press,Taylor & Francis, 2009.

Baalu, T.R.; "The Wildlife Protection Act, 1972", Nataraj Publication,2001.

Learning Objectives: After studying this paper the students will know

a) The significance of wildlife forensics in cases of poaching and trafficking.
b) The forensic importance of animal hair evidence.
c) How wildlife forensics aid in conserving natural resources.
d) How wildlife forensics assist in species identification.

Four Year UG in Forensic Science

Semester-IV

Major -I (Paper Code)

Dermatoglyphics

Unit 1: Basics of fingerprinting

Fingerprint, History of fingerprint. Development of fingerprints. Formation of ridges. Types of fingerprint patterns. Classification of fingerprint: Primary, Secondary, Sub secondary, Major, Final and Key.

Unit 2: Types of fingerprint evidences

Development of Latent fingerprint: Physical and Chemical method. Development of latent print on human skin, Constituents of sweat residue. Preservation of developed fingerprints.

Unit 3: Development of latent fingerprints

Application of light sources in fingerprint detection. Digital imaging for fingerprint enhancement, Developing fingerprints on gloves. Metal deposition method, Automated Fingerprint Identification System.

Unit 4: Other Impressions

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

Suggested Readings:

J.E. Cowger, Friction Ridge Skin, CRC Press, Boca Raton (1983).

1. D.A. Ashbaugh, Quantitative-Qualitative Friction Ridge Analysis, CRC Press, Boca Raton(2000).

2. C. Champod, C. Lennard, P. Margot an M. Stoilovic, Fingerprints and other Ridge SkinImpressions, CRC Press, Boca Raton (2004).

3. Lee and Gaensleen's, Advances in Fingerprint Technology, 3rd Edition, R.S. Ramotowski(Ed.), CRC Press, Boca Raton (2013).

Four Year UG in Forensic Science

Semester-IV

Major -I (Paper Code)

Practical's based on Dermatoglyphics

1. To record plain and rolled fingerprints.
2. To carry out ten-digit classification of fingerprints.
3. To identify different fingerprint patterns.
4. To carry out ridge tracing and ridge counting.
5. To develop latent fingerprint by physical and chemical method.
6. To classify fingerprints according to single digit classification.

Learning Objectives: After studying this paper the students will know –

a. The fundamental principles on which the science of fingerprinting is based.
b. Fingerprints are the most infallible means of identification.
c. The world's first fingerprint bureau was established in India.
d. The method of classifying criminal record by fingerprints was worked out in India, and byIndians.
e. The physical and chemical techniques of developing fingerprints on crime scene evidence.
f. The significance of foot, palm, ear and lip prints.

Four Year UG in Forensic Science

Semester-IV

Major -II (Paper Code)

Forensic Biology and Serology

Unit 1: Biological Evidence

Nature and importance of biological evidence. Composition and Functions of Blood and Semen. Types and identification of microbial organisms of forensic significance. Diatoms and their forensic significance.

Unit 2: Examinations of Biological Evidences

Identification of Blood, Semen, Saliva and Urine through preliminary and confirmatory crystal examinations. Morphology and biochemistry of human hair. Significance of hair evidences. Transfer, persistence and recovery of hair evidence. Structure and comparison of human and Animal hair.

Unit 3: 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 wildlifeforensics. Identification of pug marks of various animals.

Unit 4: Forensic Entomology

Basics of forensic entomology. Different Insects of forensic importance. Collection of entomological evidence during death investigations.

Suggested Readings:

1. L. Stryer, Biochemistry, 3rd Edition, 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 ForensicSciences, 2nd Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).

Four Year UG in Forensic Science

Semester-IV

Major -II (Paper Code)

Forensic Biology and Serology

1. *Examination of blood stain (Screening and confirmatory)*
2. *To perform precipitin test for species of origin determination.*
3. *Examination of saliva*
4. *Examination of seminal stage and microscopic examination of spermatozoa.*
5. *Examination and comparison of Human hairs.*
6. *Examination of hair of different animals as cat, dog, cow, horse and goat*
7. *To determine ABO blood grouping and Rh factor*
8. *To prepare gel plates for electrophoresis.*
9. *To perform electrophoresis for separation of various polymorphic enzymes*
10. *Examination of diatoms.*
11. *Extraction and isolation of DNA from blood and semen.*

Four Year UG in Forensic Science

Semester-IV

Major -III (Paper Code)

Forensic Chemistry and Toxicology

Unit1: Forensic Chemistry and Scope

Forensic chemistry: Definition and scope, Introduction to Narcotic drugs, Depressants, stimulants, Hallucinogens their Active components and method of analysis, Designer Drugs & Anabolic steroids, Analytical methods of analysis of IMFL, Country made and Illicit liquor, Denatured spirits and their analysis. Analysis of petroleum products Diesel. Analysis of traces of petroleum products in forensic exhibits. Comparison of petroleum products. Adulteration of petroleum products. Edible oil and their adulterants.

Unit 2: Basics of Toxicology

Toxicology: Definition and Scope, Significance of toxicological findings, Techniques used in toxicology, Toxicological analysis and chemical intoxication tests, Postmortem Toxicology, Clinical toxicology, Dose-response relationship, Lethal dose 50, Lethal concentration 50 and Effective dose 50.

Unit 3: Poisons

Poison: Definition, Classification, Physico-chemical characteristics and mode of action of poisons, Metabolism and excretion, Accidental, Suicidal and Homicidal poisonings and relevant Sections, Signs and symptoms of common poisoning and their antidotes, Collection and preservation of viscera, blood and urine for various poison cases, Extraction and isolationof poison from viscera.

Unit 4: Identification and Analysis of Poisons

Identification and Analysis of Biocides and Heavy metals in body fluids, General Introduction to Animal poisons, Vegetable poisons, Poisonous seeds, fruits, roots and mushrooms, Alcoholic and non-alcoholic illicit liquors, Analysis and identification of ethyl alcohol, Estimation of ethyl alcohol in blood and urine.

Suggested Readings:

1.R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).

2.F.G. Hofmann, A Handbook on Drugand Alcohol Abuse, 2nd Edition, OxfordUniversity Press, New York (1983).

3.S.B. Karch, The Pathology of Drug Abuse, CRC Press, Boca Raton (1996).

4.A.W. Jones, Enforcement of drink-driving laws by use of per se legal alcohol limits: Blood and/or breath concentration as evidence of impairment, Alcohol, Drug and Driving, 4, 99 (1988).

Kennedy, Thomas J., Christian, Jr., Donnell Basic Principles of Forensic Chemistry,Springer Saferestein, Criminalistics: An Introduction to Forensic Science. Prentice Hall 7.John D. DeHaan; Kirk's Fire Investigation, Prentice Hall Eaglewood Cliffs, N.J 8.Yinon J; Modern Methods & Application in Analysis of Explosives, John Wiley.

Goutam, M. P. and Goutam S Analysis of Plant Poison, Selective & Scientific Books,New Delhi.

Feigl; Spot Test in Organic Analysis, Elsevier Pub., New Delhi.

Clark, E.G.C.; Isolation and Identification of Drugs, Vol I&II, Academic Press,12.Sunshine I; Year book of Toxicology, CRC Press Series, USA

Michael J. Deverlanko et al: Hand Book of Toxicology CRC Press, USA.

Parikh C.K; Text Book of Medical Jurisprudence Forensic Medicines and Toxicology.CBS Pub. New Delhi.

Robert J. Flanagan, Andrew A. Taylor, Ian D. Watson, Robin Whelpton Fundamentals of Analytical Toxicology, Wiley.

Bamford Frank. Poisons- their isolation and identification, J &A Churchill Ltd

Four Year UG in Forensic Science

Semester-IV

Minor -I (Paper Code)

Forensic Biology and Serology

Four Year UG in Forensic Science

Semester-V

Major (Paper Code)

Questioned Documents

Maximum Marks: 100 Allotted credits: 03

UNIT – I

Questioned Document–Definition, Nature and History of document examination, Classification of Forensic Documents-Admitted, Request and Typescript specimens, Holographic documents, Care and Handling of documents, Basic tools needed for Forensic Document Examination - Hand lens, Stereo microscope, Electrostatic detection device (EDD), Video Spectral Comparator (VSC)

UNIT – II

Handwriting: Principle, General qualities, Writing habits, Individual Characteristics; Factors that causes changes in Handwriting, Systematic Examination of Handwriting; Examination of signatures, Characteristics of genuine and forged signatures; Alteration of Documents, Secret writings, Anonymous writing, Disguised writing, indented writings, Charred documents.

UNIT – III

Forgery: Various types of forgery and their examination, Determination of sequence of strokes; Age of Documents, Examination and Identification of Paper, Ink, Typescripts, seal, rubber, Carbon copies & other mechanical impressions, counterfeiting and examination of forged currency notes,

Presentation of evidence in court.

UNIT -IV

Photography; Basic principles and techniques of Black & White and colour photography, Cameras and lenses, developments and printing, Different kinds of developers and fixers, Linkage of Cameras and Film negatives, Digital photography, digital water marking & digital imaging, Photogrammetry and videography, crime scene and laboratory photography IR, UV and Portrait photography, Recent developments in photography.

Suggested Readings:

1. Ordway Hilton; Scientific Examination of Questioned Documents, Elsevier, NY

2. Albert S. Osborn; Questioned Documents, 2nd Ed., Universal Law Pub., Delhi

3. Albert S Osborn; The Problem of Proof, 2nd Ed., Universal Law Pub. Delhi

4. Charles C. Thomas; I.S.Q.D. Identification System for Questioned Documents, willy Prior Bates Springfield, Illinois, USA

5. Wilson R. Harrison; Suspect Documents Their Scientific Examination, Universal Law Pub. Delhi Indian Reprint

6. Goutam, Shubhra and Goutam M.P. Physical Evidences- Introduction and Bibliography on their forensic analysis,Shiv Shakti Book Traders, New Delhi.

7. Morris Ron N; Forensic Handwriting Identification, Acad .Press, London (2001)

8. Lerinson Jay; Questioned Documents, Acad Press, London

9. Mcmenamin, G. R; Forensic Linguistics- Advances in Forensic Stylistics, CRC

10. Ellen David; Questioned Documents- Scientific Examination, Taylor & Francis, Washington

(1997)

11. H.L. Blitzer and J.Jacobia; Forensic Digital Imaging and Photography, Academic Press (2002)

Four Year UG in Forensic Science

Semester-V

Major-I (Paper Code)

Practical's based on Questioned Documents

1. Examination of ink by TLC
2. Examination of paper
3. Examination of rubber stamp.
4. Examination of typescripts and printed matters
5. Examination of photocopy documents for machine defect marks.
6. Detection and decipherment of alterations, additions and over writing.
7. Detection of forgeries including traced and simulated forgery and built up documents.
8. Decipherment of indented writings, secret writings and charred documents
9. Examination of security documents Currency notes, Stamp Papers and lottery tickets.
10. Examination of erasures-mechanical and chemical erasures.

Four Year UG in Forensic Science

Semester-V

Major-II (Paper Code)

Forensic Anthropology

Unit 1: Significance of Forensic Anthropology

Scope of forensic anthropology. Introduction and forensic significance of osteometry and craniometry in personal identification Study of human skeleton. Nature, formation, types and identification of human bones. Comparative skeletal anatomy of human and non-human bones. Determination of age, sex, stature and side (long bones) from skeletal material.

Unit 2: Forensic Odontology

Development and scope. Role in mass disaster and personal identification. Types of teeth and their functions. Structural variation in human and non-human teeth. Dental anomalies and their importance in personal identification. Eruption sequence, Gustafson's method. Age and sex determination from teeth. Bite marks its forensic significance and role in personal identification.

Unit 3: Personal Identification – Somatoscopy and Somatometry

Somatoscopy – Introduction and forensic significance in personal identification. 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. Somatometry – Introduction and forensic significance in personal identification. Measurements of head, face, nose, cheek, ear, hand and foot, body weight, height. Indices - cephalic index, nasal index, cranial index, upper facial index.

Unit 4: Facial Reconstruction

Portrait Parle/ Bertillon system. Photofit/identity kit. Facial superimposition techniques. Cranio facial super imposition techniques – photographic super imposition, video superimposition, Roentgenographic 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.

Suggested Readings:

M.Y. Iscan and S.R. Loth, The scope of forensic anthropology in, Introduction to ForensicSciences, 2nd Ed., W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).

D. Ubelaker and H. Scammell, Bones, M. Evans & Co., New York (2000).

S.Rhine, Bone Voyage: A Journey in Forensic Anthropology, University of Mexico Press,Mexico (1998).

Four Year UG in Forensic Science

Semester-V

Major-II (Paper Code)

Practical's based on Forensic Anthropology

1. To determine 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.
9. To conduct portrait parley using photo fit identification kit.

Learning Objectives: After studying this paper the students will know –

Importance of forensic anthropology in identification of persons.

Different techniques of facial reconstruction and their forensic importance.

Significance of somatoscopy and somatometry.

Four Year UG in Forensic Science

Semester-V

Major-III (Paper Code)

Digital and Cyber Forensic

Unit 1: 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.

Unit 2: Computer Crimes

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. 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 3: 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 bit- stream of the original media. Collection and seizure of magnetic media. Examining forensically sterile media. Restoration of deleted files. Encryption and decryption methods.

Unit 4: Fundamentals of Networking

Introduction to network, LAN, WAN and MAN, TCP/IP Protocol, OSI Model, Relevant Section of IT Act 2000, Networking Protocols, Password cracking and E-mail tracking, File system, Network Security Threats, Vulnerabilities.

Suggested Readings:

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).
5. Andrew S. Tanenbaum, Computer Networks, 5th edition Library of Congress Cataloging-in-Publication Data, (1981).

Four Year UG in Forensic Science

Semester-V

Major-III (Paper Code)

Digital and Cyber Forensic

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

Learning Objectives: After studying this paper the students will know –

The basics of digital forensics.

The cases which fall under the purview of digital crimes.

The types of digital crimes.

The elements involved in investigation of digital crimes.

Four Year UG in Forensic Science

Semester-V

Minor-I (Paper Code)

Forensic Anthropology

Unit 1: Significance of Forensic Anthropology

Scope of forensic anthropology. Introduction and forensic significance of osteometry and craniometry in personal identification Study of human skeleton. Nature, formation, types and identification of human bones. Comparative skeletal anatomy of human and non-human bones. Determination of age, sex, stature and side (long bones) from skeletal material.

Unit 2: Forensic Odontology

Development and scope. Role in mass disaster and personal identification. Types of teeth and their functions. Structural variation in human and non-human teeth. Dental anomalies and their importance in personal identification. Eruption sequence, Gustafson's method. Age and sex determination from teeth. Bite marks its forensic significance and role in personal identification.

Unit 3: Personal Identification – Somatoscopy and Somatometry

Somatoscopy – Introduction and forensic significance in personal identification. 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. Somatometry – Introduction and forensic significance in personal identification. Measurements of head, face, nose, cheek, ear, hand and foot, body weight, height. Indices - cephalic index, nasal index, cranial index, upper facial index.

Unit 4: Facial Reconstruction

Portrait Parle/ Bertillon system. Photofit/identity kit. Facial superimposition techniques. Cranio facial super imposition techniques – photographic super imposition, video superimposition, Roentgenographic 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.

Suggested Readings:

M.Y. Iscan and S.R. Loth, The scope of forensic anthropology in, Introduction to ForensicSciences, 2nd Ed., W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).

D. Ubelaker and H. Scammell, Bones, M. Evans & Co., New York (2000).

S.Rhine, Bone Voyage: A Journey in Forensic Anthropology, University of Mexico Press,Mexico (1998).

Four Year UG in Forensic Science

Semester-V

Minor-I (Paper Code)

Practical's based on Forensic Anthropology

1. To determine 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.
9. To conduct portrait parley using photo fit identification kit.

Learning Objectives: After studying this paper the students will know –

Importance of forensic anthropology in identification of persons.

Different techniques of facial reconstruction and their forensic importance.

Significance of somatoscopy and somatometry.

Four Year UG in Forensic Science

Semester-VI

Major-I (Paper Code)

Forensic Ballistics and Physics

UNIT- I

Ballistics: Introduction, History and Scope, Internal, External and Terminal Ballistics, Firearms,

Definition and Classification, Characteristics and firing mechanism of smooth bored and Rifled

firearms (Pistol, Revolver, and Rifles, etc), Classification, nomenclature and construction of country made firearms.

UNIT -II

Ammunition: Definition, classification and constructional features of different types of Cartridge,

Types of primer & priming composition, propellant and their compositions, Bullets, Pellets and wads. Gun Shot Residues (GSR) analysis, Explosives: definition, types and classification of explosives, Arms and Explosives Act, Firearm injuries.

UNIT- III

Forensic Physics: Definition, area and scope, Types and Characteristics of Tool marks: Glass: Types of glass and their composition, Types and Identification of glass fractures, examination and its forensic significance.

UNIT- IV

Forensic analysis of Paint, Soil, Papers, Foot Prints and Tyre Impression, Principle & Technique of Restoration, Etching Reagents, Fibers - Classification and Characteristics examination of fibers, Physical matches of broken objects.

Suggested Readings

1. Working Procedure Manual Ballistics/Physics, DFS, New Delhi,2005

2. Hatcher Jury & Weller, 1987: Firearm Investigation Identification and Evidence, the University Book Agency, Allahabad.

3. Gunther & Gunther, 1935: The Identification of Firearms, Willies, New York.

4. Jauhri, M. 1980: Monograph on Forensic Ballistics, Govt. of India Publication, New Delhi.

5. Burrad, 1951: The Identification of Firearms and Forensic Ballistics.

6. Sharma, B.R.: Firearms in Criminal Investigation and Trails, 1990.

7. Dimado: Gunshot Wounds, 1987.

8. Kumar K: Forensic Ballistics in Criminal Justice, 1987

9. Raymond C Murray & John C.F Tedrew; Forensic Geology, Prentice Hall NJ.

10. B. Caddy; Forensic Examination of Glass and Paints Analysis and Interpretation ISBN 0784 05749 (2001)

11. Safferstein, R, Handbook of Forensic Science, Vol. I, II, (Ed.) Prentice Hall, Eaglewood Cliffs, NJ.

12. Siegel, J. A., Saukko, P. J. And Knupfer, G.C., Encyclopedia of Forensic Sciences, Academic Publishers, London.

13. Philip Rose; Forensic Speaker Identification, Taylor and Francis, Forensic Science Series, London (2002).

14. Eckert W.G. Introduction to Forensic Sciences, CRC, New York.

15. Nickolls LC; Scientific Investigation of Crime, Butler west, London (1956)

Four Year UG in Forensic Science

Semester-VI

Major-I (Paper Code)

Practical's based on Forensic Ballistics and Physics

1. Identification of firearms, cartridges, bullets, gunpowder, etc.
2. Matching by comparison microscope bullets and cartridge cases.
3. Lifting or prints and impressions by caste and replicas.
4. Sole prints comparison and their lifting from the crime scene
5. Comparison of Tool Marks
6. Comparison of soil samples by Density gradient tube method.
7. Comparison of broken glass bangles.
8. Restoration of erased identification marks.
9. Physical matching of broken pieces of different objects.
10. Determination of density of glass fragments

Four Year UG in Forensic Science

Semester-VI

Major-II (Paper Code)

Elementary Molecular Biology and Forensic DNA Technology

Nucleic acids and genome: The central dogma, evidence that DNA is genetic material, Structure of DNA and RNA, physico chemical properties of nucleic acids and genomes-Cot plot, kinetic and chemical complexity, Tm, buoyant density, satellite DNA, Organization of the *E.coli* and human genomes.

Chromosomes, Genes and Transcription in Prokaryotes: Chromosome, structure of chromatin-nucleosomes, solenoids, scaffolds. Chromatin domains and isochores, structure and functional organization of centromeres and telomeres. Transcription: Structure of genes, promoters, enhancers. Structure and mode of action of *E. coli* RNA polymerase. RNA Processing and Splicing, Co- and –post transcriptional modifications in prokaryotes and eukaryotes, Catalytic RNA.

DNA Replication, Repair and Translation: Replication: prokaryotes and eukaryotes models, DNA dependent and RNA dependent polymerases, mode of action, DNA amplification and polytenization, DNA damage and repair, Translation: Structure of tRNA, rRNA and mRNA, ribosomes. Genetic code

Molecular and functional genomics tools in Forensic: Applications of DNA finger printing methods, RAPD, RFLP, and AFLP. Transcriptome profiling methods. Antisense oligonucleotides, microRNA and profiling techniques. Analysis of gene function by gene disruption, gene knock outs. Error prone and PCR-mediated methods, site directed mutagenesis, Approaches for controlled gene expression and Protein engineering.

Reference Book:

1. J. E. Krebs, E. S. Goldstein and S. T. Kilpatrick (2017) Lewin's Genes XII, 12th Edn., Jones & Barlett Pub., USA
2. J. D. Watson, T. A. Baker, S. P. Bell, A. Gann, M. Levine, R. Losik, CSHLP (2017) Molecular Biology of the Gene, 7th Edition, Pearson.
3. Primrose, S., Twyman R. & Old B. (2009) Principles of Gene manipulation & Genomics, 8th Edn., Blackwell Science. R. Weaver (2011) Molecular Biology, 5th Edn., McGraw-Hill.
4. J. D. Watson, R. M. Myers, A. A. Caudy, & J. A. (2006) Recombinant DNA: Genes & Genomes, 3 Edition, W. H. Freeman Publ.
5. Glick B. R., Pasternak J. J. and Patten, C. L. (2010) Molecular Biotechnology - Principles and applications of recombinant DNA, 4th Edn., ASM Press.

Four Year UG in Forensic Science

Semester-VI

Major-II (Paper Code)

Practical's based on Elementary Molecular Biology and Forensic DNA Technology

1. Genomic DNA isolation from body fluids.
2. DNA Quantification using UV-Visible spectrophotometer.
3. Polymerase Chain Reaction (PCR)
4. Amplified Fragment Length Polymorphism analysis of CYP gene.
5. Genetic Polymorphism analysis of Glutathione S transferase (GST) genes.

Learning Outcomes

a) Understanding nucleic acids and genome.
b) Learn about chromosomes, genes and transcription in prokaryotes.
c) Learn about Replication, Repair and Translation machinery of Prokaryotes and eukaryotes.
d) Learn about molecular tools used in DNA forensics

Four Year UG in Forensic Science

Semester-V

Major-III (Paper Code)

Forensic Medicine

Unit-I

Forensic Medicine- Definition, Scope and Importance,The Forensic Autopsy, Postmortem changes, Postmortem Hypostasis, Postmortem report, Role of Forensic Pathologist medicolegal Expert in the investigation of death,collection and preservation of postmortem exhibits.

Unit II

Death: Definition, types, and natureScene Investigation, Introduction to Sudden and unexpected Death, Infanticide, Thermal Deaths, Anesthetic and operative death, Death due to Drowning and Electrocution, Starvation and its types, Asphyxial Death, Time of Death-Time Indicators Bladder content, Stomach Content, Lividity, Cooling of body, Rigor Mortis,

Unit - III

Injuries-Definition and Nature, Age of injuries, Ante-mortem and Post mortem, Fatal injuries,

Incapacitation. After effects of Fatal injuries, Introduction to Trauma to the human body, Wounds Due to Blunt Trauma. Blunt Trauma Injuries of the Trunk and Extremities, Trauma to the Skull and Brain: Craniocerebral Injuries, Wounds Due to Pointed and Sharp, Edged. Classification -Abrasion, contusion, Bruise, Laceration, Punctured Incised, gun shot.

Unit -IV

Burns-Classification of burns Ante-mortem and Post mortem Burns, Cause of death, Scalding, Electrocution The Effects of Heat & Cold: Hyperthermia & Hypothermia, Deaths Due to Fire, Carbon Monoxide Poisoning.

Recommended Books

1. David Dolinak, Evan Matshes , Emma O. Lew .Forensic Pathology: Principles and Practice , Academic Press

2. Dominick DiMaio , Vincent J.M. DiMaio M.D.Forensic Pathology, Second Edition (Practical Aspects of Criminal & Forensic Investigations) CRCPress.

3. Matshes & Dolinak & Lew Forensic Pathology, Principles and Practice 1st Edition Academic Press

4. Jay Dix , Robert Calaluce, M Guide to Forensic Pathology,. CRC

5. Vincent J.M. DiMaio , Suzanna E. Dana Handbook of Forensic Pathology, Second Edition,CRC

6. Richard Shepherd. Simpson's Forensic Medicine, Hodder Arnold;

7. Payne-James, Jason (ed.; et al.) Encyclopedia of Forensic & Legal Medicine. Amsterdam; Boston: Elsevier Academic Press

8. Werner U. Spitz (Author, Editor), Daniel J. Spitz. Spitz and Fisher's Medicolegal Investigation of Death: Guidelines for the Application of Pathology to Crime Investigation [Hardcover] Charles C Thomas Pub Ltd

9. Parikh C.K. Text book of Medical Jurisprudence, forensic medicine and toxicology. CBS Publishers and Distributors , New Delhi

10. Subrahmanyam B.V.; Modi's Medical Jurisprudence & Toxicology, LexisNexis Butterworths, India .

Four Year UG in Forensic Science

Semester-V

Major-III (Paper Code)

Practical's based on Forensic Medicine

1. .To design a questionnaire for the first responder to the death scene.

2.To design a protocol to deal with the media at the crime scene.

3.To design a checklist for the forensic scientists at the death scene. 4.To design a canvass form giving description of an unidentified victim.5.To analyze and preserve bite marks.

Four Year UG in Forensic Science

Semester-V

Minor-I (Paper Code)

Forensic Ballistics and Physics

UNIT- I

Ballistics: Introduction, History and Scope, Internal, External and Terminal Ballistics, Firearms,

Definition and Classification, Characteristics and firing mechanism of smooth bored and Rifled

firearms (Pistol, Revolver, and Rifles, etc), Classification, nomenclature and construction of country made firearms.

UNIT -II

Ammunition: Definition, classification and constructional features of different types of Cartridge,

Types of primer & priming composition, propellant and their compositions, Bullets, Pellets and wads. Gun Shot Residues (GSR) analysis, Explosives: definition, types and classification of explosives, Arms and Explosives Act, Firearm injuries.

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Four Year UG in Forensic Science

Semester-V

Minor-I (Paper Code)

Practical's based on Forensic Ballistics and Physics

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10. Determination of density of glass fragments

Four Year UG in Forensic Science

Semester-V

Major-I (Paper Code)

Biometrics as Tool for personal Identification

Unit 1: Introduction to Biometrics

Definition of Biometrics, Features and function of biometric system, working of biometrics, Classification of biometric systems – physical and behavioral, Strength and weakness of physical and behavioral biometrics.

Unit 2: Physical Biometrics

Physical biometrics: Fingerprints, Iris, Retina, Facial recognition, Hand geometry, DNA.

Unit 3: Behavioral Biometrics

Behavioral Biometrics: Speaker recognition, Signature, Gait biometrics

Unit 4:Biometric Parameters

Biometric parameters: FM, FNM, FTC, FTE, FAR, FRR, EER, ROC, DET; EmergingBiometric Technologies.

Suggested readings:

Ross, Jain, Nandakumar, Introduction to Biometrics, Springer (2011)

Jucheng Yang, Biometrics, InTech, (2014)

Midori Albert, Biometrics - Unique and Diverse Applications in Nature, Science, andTechnology, InTech (2014)

Learning Objectives: After studying this paper the students will know

The importance of biometrics systems in criminal cases.

Knowledge and awareness regarding current and advanced biometric identificationsystems.

Use of biometrics in personal identification.

To provide information regarding the applications of biometric parameters andtechnologies.