Program Objectives
B.Sc. (Hon.) Forensic Science
(Under graduate program offered by the department)

1. Name of the program: Bachelor of Science in Forensic Science

2. Program Specifications:

School of Studies: School of Studies of interdisciplinary Education and Research

Department: Forensic Science

Program: B.Sc. (Forensic Science) CBCS Scheme

Head of the Department: Dr. Bharti Ahirwar

Date of Approval in Board of Studies: 28/06/2018

Date of Last revision: 2018

Next revision due: 2021

3. Mode of Study: Full time (Semester system):

Purpose of the course: B.Sc Forensic Science composed of different courses like Criminal law, Crime and Society, Forensic Psychology, Crime Scene Management, Biometrics, Questioned Documents, Forensic Dermatoglyphics which are theoretical curriculum for students. Indoor and outdoor Crime scene investigation, techniques to handle the evidences, maintaining chain of Custody, handling and packaging of evidences, Toxicological, Biological, Chemical are the practical subject area of the course. During the investigating process, forensic equipment is used to process samples and evidence to solve crimes.

Program objectives: Our mission as a Forensic science program is to develop professional, ethical graduates whose competence in problem-solving, legal analysis and application, quantitative reasoning, investigation and scientific laboratory procedures can be applied to immediate employment or advanced study.

Skills: The Students will learn the following the skills after completion of the course:

- The basic analysis of biological samples found at the crime scene.
- To handle the evidences left out at the crime scene.
- The basic methods for examine the different types of questioned documents.
- Identify the different petroleum products by TLC examination.
- Examination of counterfeit Indian currency notes, passports and other mechanical impressions.
- Identify the classification and mode of different types of poisons.
- Understanding the classification of firearms and their mechanisms.

Programme specific objectives:

- To develop the undergraduate level students with the specific knowledge of handling different types of evidences and their examinations.
- To develop the laboratory skills in examining different types of evidences found at the crime scene.
- To prepare the students to compete for employment in State and central level Organizations.

Programme outcomes: On completion of the programme students will

- Apply the Laboratory skills to participate in the career needs of Forensic community.
- Become trained in the laboratory skills of different division of Forensic Science.
- Be able to work with different R&D organizations.

Course Specific Objectives and Outcomes

Course Code	Course Name	Course objectives	Course outcomes
LS/FSC/C-101L	Introduction to Forensic Science	To Provide Knowledge about the basic principles of Forensic Science, different branches, functions, nature and scope of Forensic Science. Course will Provide detail idea about different roles, Organisational setup and functions of various Government Departments such as FBI, CBI, RAW, BPRD,NCRB etc, Forensic laboratories and Police in Crime Scene investigations.	After completion of course the students will have knowledge of Principles of Forensic science. • The detail study will help to understand about the basics and different branches of Forensic Sciences. • Will help to know about the working and functioning of Forensic science laboratories. • Will learn the Police science its role in criminal investigation and Prevention of crime.
LS/ FSC/C-101P	Practical's based on Crime Scene	This will Provide the details of various case studies with forensic aspect, study of crime rate and various reports generated by NCRB, organisational setup study and improvements required in different government departments related to forensic science, knowledge of importance of each evidence in case studies, and study of format of various reports, report writing etc.	• Students will able to learn how the Principles of Forensic science used to solve criminal cases. • Students will learn to generate reports on different cases. • Will learn the importance of various evidences and how they used to solve the criminal cases.
LS/ FSC/C-102L	Crime and Society	This Provide knowledge about crime, Impact of crime and criminals in society, elements of crime, importance of Criminology, different theories for crime causation, criminal behaviour, Current crime trend in society, Component and role of criminal justice system, Human Rights,	Course will provide knowledge to students such as What is crime and its impact on society. What all theories proposed behind the causation criminal behaviour. Human rights and its significance.

		framing of charges, Correctional measures and rehabilitation of Criminals.	
LS/ FSC/C-102P	Practical's based on Crime and Society	In this course student will get knowledge about the theories of crime and criminal with studying various past cases, they will have knowledge about various cases involving juvenile delinquency, impact of stress on victims and study of victimology. How modernisation impacts the crime rate, correlation between deviant behaviour and criminality.	Course outcome • Student will get knowledge about how post trauma affects victim. • They will able to find how deviant behaviour is correlated with criminal tendency, • Different factors for increasing crime rate.
LS/FSC/C-203-L	Criminal Law	This course gives idea about the Criminal justice system, Different Acts and Provision in Indian Constitution related to Forensic science, hierarchy of criminal courts . Knowledge of Various sections of Criminal Procedure code, Indian Penal Code and Indian evidence Act, Acts related to socio economic crime, environmental crime and about types of offences Provided under the Act.	• Students will able to classify the offences, will have knowledge about criminal courts and their functions. • They will learn different sections of IPC, IEA, Cr.P.C. • They will have knowledge about Dowry Act, NDPS Act, Wildlife Act etc.
LS/FSC/C-203-P	Practical's based on preparing schedules	In this course student will get to know about cognizable, non- cognizable offences, case studies of various cases involving charges for Murder, Sexual assault etc. Will have knowledge about expert opinion, powers and limitations of magistrate.	Corse outcome • Different cases will be studied and students will have knowledge about different sections of IPC. • Role of expert witness, and relevant sections related to it.
LS/FSC/C-204-L	Forensic Psychology	To Provide the basic Knowledge of Psychology and its application in Forensic science, legal Applications to	Course Outcome • Students will able to correlate the theories and various aspects

		the field, role of Forensic psychiatric and Forensic Psychology, about Juvenile delinquency , role of media and its Psychological impact on criminal Justice system. Study and classification of various psychological and Personality disorders with their traits, this emphasis on importance of Psychological assessment in criminal identification, various psychological test and deceptive tools, Principle and working of various devices used in Psychological assessment such as Polygraph, Narco analysis, Brain mapping.	of Psychology in Forensic science. • They will learn assessment techniques, how actually interview questions are prepared. • Will come to know about role of media and police. • Will have knowledge of various personality disorders.
LS/FSC/C-204-P	Practical's based on Forensic Psychology	This will Provide knowledge of various aspects in cases involving Forensic Psychology, use of various inventories for assessment of criminal, study of various signatures in serial killer murder cases,	This will provide such as • Students will learn the use of various Personality inventories such as MMPI, EPI etc. • Learn the crime event patterns and criminal behaviour from signature and evidences in serial murders. • Learn to Prepare the report on Psychological aspects found in criminal cases.
LS/FSC/C-305-L	Forensic Dermatoglyphics	After studying this course it will Provide Knowledge about the Principles behind science of Fingerprint, Basic knowledge about types and patterns of Fingerprints and its classification, different physical and chemical methods used to develop	The outcome of this course is that student will learn about • Fingerprints and how Fingerprint helps in identification of criminal. • How other impressions such as

		fingerprint on various evidences in crime scene, classifying criminal record by fingerprints and worked carried out in India, Fingerprint recording bureau, and its establishment, other impressions evidences such as lip prints, foot prints etc its classification and significance.	lip prints, foot prints etc are used for individual identification. How criminal records are maintained.
LS/FSC/C-305-P	Practical's based on Finger Prints	This course will provide knowledge of collection of Fingerprints, different patterns and types of fingerprints. This course tells about the different classification of Fingerprints, different aspects used for matching of fingerprints. This will provide details of ridge characteristics, how ridge counting and ridge tracing helps in fingerprint identification and comparison.	Students will able to Collect the rolled fingerprints. Will able to identify the patterns of fingerprints. They will be able to further classify the fingerprints. They will be able to practically develop the latent fingerprints using various powder and chemical methods. They will be able to perform Ridge counting, Ridge tracing etc.
LS/FSC/C-306-L	Technological Methods in Forensic Science	To Provide knowledge about various instrumental techniques used in Forensic science and importance of chromatographic and spectroscopic techniques in processing crime scene evidence. Significance of microscopy in visualizing trace evidence and comparing it with control samples, Fundamental Principles and types of microscope used in forensic science, The utility of colorimetry, electrophoresis and neutron activation analysis in identifying chemical and	From this course students will learn How different evidences are analysed using various instrumental methods. Student will have knowledge about different microscopes and photography technique required in evidence collection and examination. Students will learn the basic principle working and forensic application of

		biological materials, and principle and significance of Photography, IR,UV photography.	electrophoreotic techniques, spectroscopic and chromatographic techniques.
LS/FSC/C-306-P	Practical's based on Technological Methods	This course will provide knowledge of basic principle of TLC and its forensic application, they will get knowledge about photography types, different filters used and use of photography in courtroom. Analysis of various drugs and poisons using chromatography and spectroscopic techniques. Use of colorimetry in analysis and quntification of various evidences.	Student will learn • Separation of organic compounds by paper chromatography. • Different photography techniques and skills using different filters and photography at different angles of exhibits at crime scene. • Examination of ink by TLC different drugs by different instrumental methods.
LS/FSC/C-307-L	Criminalistics	Introduction to crime scene, types of crime scene, various methods of securing, searching and documenting crime scenes, evidence and type of evidences, physical evidence and importance of physical evidence student will learn of collecting, packaging and preserving different types of physical and trace evidence at crime scenes, knowledge of various trace evidences and maintaining chain of custody,	This course will help students to learn about • Steps in crime scene management and their significance. • Student will learn different searching, collection and packaging methods. • Students will have knowledge about different physical and trace evidences that are mostly encounter on crime scene with their significance.
LS/FSC/C-307-P	Practical's based on Crime scene samples	This course will provide knowledge of various evidences found on crime scene, its examination by physical matching and study will provide the detail idea about the significance of each	• Students will have a knowledge about sketching, photography of crime scene. • They will have practical knowledge

		evidences found at crime scene. The course tells us about the various chemical test and method used for analysis of physical evidences. It will also provide the knowledge about the reconstruction of crime scene , sketching methods used in crime scene management.	about collection packaging sealing and labelling of evidence, how chain of custody is maintained. Students will able analyse evidences found at crime scene by physical matching and chemical test. They will be able to reconstruct the crime scene.
LS/FSC/C-408-L	Forensic Chemistry	The methods of analyzing trace amounts of petroleum products in crime scene evidence. The classification and characteristics of the narcotics, drugs and psychotropic substances. The method of searching, collecting, preserving and analyzing arson evidence.	After completion of the course, students will know The different classification of narcotic drugs and psychotropic substances. The collection and preservation of different types of evidences.
LS/FSC/C-408-P	Practical's based on Forensic Chemistry	To identify the different types of gasoline and petroleum products. To examine the petrol, diesel and kerosene oil. To examine the different explosives substances by Thin Layer Chromatography.	Obtain the different types of examination of petroleum products. Identify the different petroleum products examination by TLC and HPLC.
LS/FSC/C-409-L	Questioned Documents	The importance of examining questioned documents in crime cases. The importance of detecting frauds and forgeries by analyzing questioned documents. The tools required for examination of questioned documents. Examination of computer generated, typed and Xeroxed documents.	After completion of the course, students will have a sound knowledge of the questioned documents. The methods for examine the different types of questioned documents. Natural variations in hand writings.

		Natural variations and fundamental divergences in handwritings. Examination of counterfeit Indian currency notes, passports, visas and stamp papers, seal, rubber & other mechanical impressions.	Examination of counterfeit Indian currency notes, passports and other mechanical impressions.
LS/FSC/C-409-P	Practical's based on Questioned Documents	To identify handwriting characters. To study natural variations in handwriting. To examine the security features of currency notes, passports and plastic money. To study alterations, obliterations and erasures in handwriting samples. Examination of Secret and Indented writing.	Obtain the knowledge about the handwriting variations. Understanding the security features of currencies and passports.
LS/FSC/C-410-L	Forensic Biology	The significance of biological and serological evidences. The importance of biological fluids – blood, urine, semen, saliva, sweat and milk – in crime investigations. Fundamentals and significance of wild life Forensics. Protected and endangered species of animals and plants.	Understanding the biological and serological evidences Obtain the knowledge about the preliminary and confirmatory examination of biological fluids. Importance of Wild life evidences.
LS/FSC/C-410-P	Practical's based on Forensic Biology	To identify the different types of biological evidences i.e blood, saliva, semen, urine. The basic difference between human and animal hairs. To examine the morphology of hair.	Acquire the knowledge about the different types of biological evidences. Morphology of human and animal hairs.
LS/FSC/C-511-L	Forensic Ballistics	The course is designed to provide complete knowledge of the classification of firearms and their firing mechanisms. The methods of identifying firearms. The methods for characterization of gunshot residue.	Understanding the classification of firearms and their mechanisms. Characterization and identification of Gunshot Residue
LS/FSC/C-511-P	Practical's based on	To correlate the velocity of bullet with the impact it	After completion of the course, students will

	Forensic Ballistics	produces on the target. To correlate the striking angle of the bullet with the impact on the target. To correlate the nature of injuries with distance from which the bullet was fired.	Obtain the knowledge about the internal, external and Terminal ballistics. Identify the bullets, pellets and wads fired from improvised, country made firearms
LS/FSC/C-512-L	Forensic Toxicology	This course provides the classification of poisons and their modes of actions. The classification and characteristics of the narcotics, drugs and psychotropic substances. The significance of toxicological studies in forensic science	Identify the classification and mode of poison. Classification and Identification of NDPS, Narcotics, stimulants, depressants and hallucinogens
LS/FSC/C-512-P	Practical's based on Forensic Toxicological analysis	To identify metallic poisons, organic poisons, ethyl alcohol, methyl alcohol. To carry out quantitative estimation of ethyl alcohol.	Identification of different types of poisons, qualitative and quantitative estimation of ethyl alcohol.
LS/FSC/C-613-L	Forensic Anthropology	Importance of forensic anthropology in identification of persons. Different techniques of facial reconstruction and their forensic importance	Role of Forensic Anthropology and Odontology in mass disasters. Usage of Facial reconstruction and Super imposition techniques.
LS/FSC/C-613-P	Practical's based on Forensic Anthropology	To determine age and gender from skull, teeth and pelvis. To study identification and description of bones and their measurements. To investigate the differences between animal and human bones. To estimate stature from long bone	Forensic significance of Osteometry and Craniometry in personal identification. Study of human skeleton.
LS/FSC/C-614-L	Forensic Medicine	To know the fundamental aspects and scope of medical Jurisprudence, Legal procedure in criminal court. Rules for medico-legal	After completion of the course, students will know Rules for medico legal autopsies.

		Autopsies. Classification mode manner and causes of death. Types and classification of Injuries. Difference between Ante mortem and Post mortem injuries.	Medical evidence and Medical witness. Investigation of Asphyxial death and sexual offences.
LS/FSC/C-614-P	Practical's based on Forensic Medicine	To identify the differences between anti-mortem and post-mortem injuries. To identify the different types of mechanical injuries.	Different types of injuries. Determination of time since death

Syllabus for

3 Years UG Programme

In

Forensic Science

2018-19

Forensic Science

School of Life Sciences
Department of Forensic Science
Guru Ghasidas Vishwavidyalaya
Bilaspur (C. G)-495009

UG COURSE IN FORENSIC SCIENCE
(THREE YEARS / SIXSEMESTERS)

28/6/2018

28/6/18

B.Sc. Hon's Forensic Science

Semester	Course Opted	Course Code	Name of the course	Credit	Hour / week
I	Core-1	LS/FSC/C-101L	Introduction to Forensic Science	4	4
	Core -1 Practical	LS/ FSC/C-101P	Practicals based on Crime Scene	2	4
	Core -2	LS/ FSC/C-102L	Crime and Society	4	4
	Core -2 Practical	LS/ FSC/C-102P	Practicals based on Crime and Society	2	4
	Generic Elective - 1 (GE- I)	LS/ FSC/GE-101/L	Elementary Forensic Science	4	4
	Generic Elective - Practical	LS/ FSC/GE-101/P	Practicals based on Crime Scene Investigation	2	4
	Ability Enhancement Compulsory Course (AECC)	LS/ FSC/AECC-101/EC	English Communication / MIL (Hindi Communication)	4*	4
	ECA	LS/FSC/ECA/	ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others	2	(2)
			Total	**24**	**28**
II	Core-3	LS/FSC/C-203-L	Criminal Law	4	4
	Core -3 Practical	LS/FSC/C-203-P	Practicals based on preparing schedules	2	4
	Core -4	LS/FSC/C-204-L	Forensic Psychology	4	4
	Core -4 Practical	LS/FSC/C-204-P	Practicals based on Forensic Psychology	2	4
	Generic Elective - 2 (GE-2)	LS/FSC/GE-202-L	Applied Forensic Science	4	4
	Generic Elective - Practical	LS/FSC/GE-202-P	Practicals based on Applied Forensic Science	2	4
	Ability Enhancement Compulsory Course (AECC)	LS/FSC/AE-201/ES	Environmental Science	4*	4
	ECA		ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/	2	(2)

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			vocational Training/ Sports/ others		
			Total	**24**	**28**
SUMMER Internship: 15 days			**Swayam Swachhta / NSS / Industrial Tour/ others**	**2**	**100**
III	Core-5	LS/FSC/C-305-L	Forensic Dermatoglyphics	4	4
	Core -5 Practical	LS/FSC/C-305-P	Practicals based on Finger Prints	2	4
	Core -6	LS/FSC/C-306-L	Technological Methods in Forensic Science	4	4
	Core -6 Practical	LS/FSC/C-306-P	Practicals based on Technological Methods	2	4
	Core - 7	LS/FSC/C-307-L	Criminalistics	4	4
	Core – 7 Practical	LS/FSC/C-307-P	Practicals based on Crime scene samples	2	4
	Generic Elective - 3 (GE-3)	LS/FSC/GE-303-L	Crime Scene Management	4	4
	Generic Elective - Practical	LS/FSC/GE-303-P	Practicals based on Crime Scene Management	2	4
	Skill Enhancement Course (SEC - 1)	LS/FSC/SEC-301-L	Introduction to Biometry	4*	2 (4)
			Total	**28**	**34**
IV	Core-8	LS/FSC/C-408-L	Forensic Chemistry	4	4
	Core -8 Practical	LS/FSC/C-408-P	Practicals based on Forensic Chemistry	2	4
	Core -9	LS/FSC/C-409-L	Questioned Documents	4	4
	Core -9 Practical	LS/FSC/C-409-P	Practicals based on Questioned Documents	2	4
	Core - 10	LS/FSC/C-410-L	Forensic Biology	4	4
	Core -10 Practical	LS/FSC/C-410-P	Practicals based on Forensic Biology	2	4
	Generic Elective - 4 (GE-4)	LS/FSC/GE-404-L	Advanced Forensic Science	4	4
	Generic Elective - Practical	LS/FSC/GE-404-P	Practicals based on Advanced Forensic Science	4	4
	Skill Enhancement Course (SEC -2)	LS/FSC/SEC-402-L	Handwriting Identification and Recognition	4*	2 (4)
			TOTAL	28	34
SUMMER Internship: 15 days			**Swayam Swachhta / NSS / Industrial/ others**	**2**	**100**
V	Core-11	LS/FSC/C-511-L	Forensic Ballistics	4	4

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	Core -11 Practical	LS/FSC/C-511-P	Practicals based on Forensic Ballistics	2	4
	Core -12	LS/FSC/C-512-L	Forensic Toxicology	4	4
	Core -12 Practical	LS/FSC/C-512-P	Practicals based on Forensic Toxicological analysis	2	4
	Discipline Specific Elective (DSE-1A) (DSE-1B)	LS/FSC/DSE-501(A)-L LS/FSC/DSE-501-(B)-L	ADigital Forensics BEconomic Offences	4	4
	DSE-1 - Practical	LS/FSC/DSE-501(A)-P LS/FSC/DSE-501-(B)-P	APracticalsbased on Digital Forensics B Practicals based on Economic offences	2	4
	Discipline Specific Elective (DSE-2A) (DSE-2B)	LS/FSC/DSE-502-(A)-L LS/FSC/DSE-502-(B)-L	AForensic Serology BAccident Investigations	4	4
	DSE-2 - Practical	LS/FSC/DSE-502-(A)-P LS/FSC/DSE-502-(B)-P	APracticalsbased on Forensic Serology B Practicals based on Accident Investigations	2	4
			TOTAL	24	32
VI	Core-13	LS/FSC/C-613-L	Forensic Anthropology	4	4
	Core -13 Practical	LS/FSC/C-613-P	Practicals based on Forensic Anthropology	2	4
	Core -14	LS/FSC/C-614-L	Forensic Medicine	4	4
	Core -14 Practical	LS/FSC/C-614-P	Practicals based on Forensic Medicine	2	4
	Discipline Specific Elective (DSE-3A) (DSE-3B)	LS/FSC/DSE-603-(A)-L LS/FSC/DSE-603-(B)-L	A DNA Typing B ModernForensic Toxicology	4	4
	DSE-3 - Practical	LS/FSC/DSE-603-(A)-P LS/FSC/DSE-603-(B)-P	APracticalsbased on DNA Typing B Practicals based on Modern Forensic Toxicology	2	4
	Discipline Specific Elective (DSE-4) + DSE-4 – Practical **Or** Dissertation/ Project work followed by	LS/FSC/D/PW/604	Dissertation/Project work	4+2=6 **Or** 5 +1=6	8

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	seminar				
			TOTAL	24	32
			TOTAL CREDITS	**152 + 4 (SI)**	

The BoS (Board of Studies) has approved the CBCS scheme of Forensic Science as per the decision of the meeting of all Heads and Course Co-ordinator of CBCS programme held in Dean's Office School of Life Sciences on 19/06/2018 BoS approved the CBCS syllabus. The syllabus of 3 years UG programme in Forensic Science was approved. The course content of 3 years UG programme in Forensic science is as per the guidelines of UGC syllabus (https://www.ugc.ac.in/pdfnews/8218435_B.Sc-Hons-Forensic-Science.pdf).

Note: As per UGC CBCS guidelines, University / departments have liberty to offer GE and SEC courses offered by any department to students of other departments. The No. of GE course is four. One GE course is compulsory in first 4 semesters each. In present scheme it is proposed to have minimum two GE courses (from one subject) in first two semester after which student shall change two GE for another subject in IIIrd and IVth semester, so that all the student can have exposure of one additional subject.

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Sl. No.	Core Papers (Theory)	Core Papers (Practical)
1	Introduction to Forensic Science	Practicals based on Crime Scene
2	Crime and Society	Practicals based on Crime and Society
3	Criminal Law	Practicals based on preparing schedules
4	Forensic Psychology	Practicals based on Forensic Psychology
5	Forensic Dermatoglyphics	Practicals based on Finger Prints
6	Technological Methods in Forensic Science	Practicals based on Technological Methods
7	Criminalistics	Practicals based on Crime scene samples
8	Forensic Chemistry	Practicals based on Forensic Chemistry
9	Questioned Documents	Practicals based on Questioned Documents
10	Forensic Biology	Practicals based on Forensic Biology
11	Forensic Ballistics	Practicals based on Forensic Ballistics
12	Forensic Toxicology	Practicals based on Forensic Toxicological analysis
13	Forensic Anthropology	Practicals based on Forensic Anthropology
14	Forensic Medicine	Practicals based on Forensic Medicine

Sl. No.	Generic Elective Papers (Theory)	Generic Elective Papers (Practical)
1	Elementary Forensic Science	Practicals based on Crime Scene Investigation
2	Applied Forensic Science	Practicals based on Applied Forensic Science
3	Crime Scene Management	Practicals based on Crime Scene Management
4	Advanced Forensic Science	Practicals based on Advanced Forensic Science

Sl. No.	Skill Enhancement Course (SEC)
1.	Introduction to Biometry
2.	Handwriting Identification and Recognition

Sl. No.	Discipline Specific Elective Papers (Theory)	Discipline Specific Elective Papers (Practical)
1	**A.** Digital Forensics	**A.** Practicals based on Digital Forensics
2	**B.** Economic Offences	**B.** Practicals based on Economic offences
3	**A.** Forensic Serology	**A.** Practicals based on Forensic Serology
4	**B.** Accident Investigations	**B.** Practicals based on Accident Investigations
5	**A.** DNA Typing	**A.** Practicals based on DNA Typing
6	**B.** Forensic Toxicology	**B.** Practicals based on Forensic Toxicology

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Three year UG Course in Forensic Science
Semester – ILS/FSC/C-101L
Core-1
Introduction to Forensic Science

Learning Objectives: After studying this paper the students will know:
a. The significance of forensic science to human society.
b. The fundamental principles and functions of forensic science.
c. The divisions in a forensic science laboratory.
d. The working of the forensic establishments in India and abroad.

Unit 1: History of 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 Daubert standard.

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

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

Suggested Readings

1. B.B. Nanda and R.K. Tiwari, Forensic Science in India: A Vision for the Twenty First Century, Select Publishers, New Delhi (2001).
2. M.K. Bhasin and S. Nath, Role of Forensic Science in the New Millennium, University of Delhi, 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).

Three year UG Course in Forensic Science
Semester – ILS/ FSC/C-101P
Core -1 Practical
Practicals based on Crime Scene

Credits: 2

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 on different 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 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.

Three year UG Course in Forensic Science
Semester – I LS/FSC/C-102 L
Core-2
Crime and Society

Learning Objectives: 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 consequences of crime in society.
e. The elements of criminal justice system.

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*.

Unit 2: Crime

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 3: Recent Advancements in Crimes

Brief Introduction towards:Victimology, Juvenile delinquency,Hate crimes,Organized crimes, Situational crime,Economic crime, Sexual Offences, Crime due to intoxication, Cyber crimes and White collar crimes, Modern Approaches towards Investigativestrategy and Role ofmedia in the solution of crime.

Unit 4: Criminal Justice System

Broad Components of criminal justice system, Policing styles and principles, Police's power of investigation, Filing of criminal charges, Community policing, Policing a heterogeneous society, Correctional measures and rehabilitation of offenders, Human rights and criminal justice system in India.

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.H.and Donald R. Cressy; The Principals of Criminology, The Times of India Press, Bombay,1968

8. Ahuja,RamCriminology,RawatPublication,Jaipur

9. Wayne Petherick,, Brent Turvey , Claire Ferguson , Forensic Criminology, Academic Press

Donald, J. (1992), The Police Photographer's Guide, Photo Test Books, Arlington Heights.

Three year UG Course in Forensic Science
Semester – ILS/FSC/C-102 P
Core -2 Practical
Practicals based on Crime and Society

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 suggests improvements.
12.To prepare a report on interrogation cells and suggest improvements.

Three year UG Course in Forensic Science
Semester – II LS/FSC/C-203 L
Core - 3
Criminal Law

Learning Objectives: After studying this paper the students will know:
a. Elements of Criminal Procedure Code related to forensic science.
b. Acts and provisions of the Constitution of India related to forensic science.
c. Acts governing socio-economic crimes.
d. Acts governing environmental crimes.

Unit 1: Law to Combat Crime

Introduction towards Indian Penal Code, Criminal Procedure Code and Indian Evidence Act, Relevant sections of IPCpertaining to offences against persons, property, CrPC, IEA and their Amendments.

Unit 2: Crime and Criminology

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.

Unit 3: Constitution of India

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 4: Acts Pertaining to Socio-economic and Environmental Crimes

Detail description ofNarcotic, 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. D.A. Bronstein, Law for the Expert Witness, CRC Press, Boca Raton (1999).
2.Vipa P. Sarthi, Law of Evidence, 6th Edition, Eastern Book Co., Lucknow (2006).
3.A.S. Pillia, Criminal Law, 6th Edition, 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, 6th Edition, Universal Law Publishing Co. Pvt. Ltd., New Delhi (2002).
6.Bayer Acts of Indian Penal Code, Criminal Procedure Code and Indian Evidence Act.

7.Turrey B; Criminal Profiling - An Introduction to Behavioral Evidence Analysis, Acad. Press Lond
8.Paranjape, N.V. Criminology and Penology, Central Law Publication, Allahabad.
9.William Bailey,The Encyclopedia of Police Science, Second Edition Garland publishing, INC, London.
10.Suderland ,E.H.and Donald R. Cressy; The Principals of Criminology, The Times of India Press, Bombay,1968
11.Reid,Sue Titus, Crime and Criminology,The Dryden Press,Illions
12.Ahuja,RamCriminology,RawatPublication,Jaipur
13.Suderland , E.H.; White Collar Crime, The Dryden Press, Newyork
14.Wayne Petherick,, Brent Turvey , Claire Ferguson , Forensic Criminology, Academic Press
15.Donald, J. (1992), The Police Photographer's Guide, Photo Test Books, Arlington Heights,

Three year UG Course in Forensic Science
Semester – II LS/ FSC/C-203 P
Core - 3 Practical
Practicals based on preparing schedules

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 prepare a schedule of the offences this may be tried under Section 260(2) of Criminal Procedure Code.
4.To study a crime case in which an accused was punished on charge of murder under Section 302.
5.To study a crime case in which an accused was punished on charge of rape under Section 375.
6.To cite example of a case in which the opinion of an expert was called for under Section 45 of the Indian Evidence Act.
7.To cite a case wherein a person was detained under Article 22(5) of the Indian Constitution. Express your views whether the rights of the person as enlisted in this Article were taken care of.
8.To cite a case under Article 14 of the Constitution of India wherein the Right to Equality before Law was allegedly violated.
9.To list the restrictions imposed on Right to Freedom of Worship under the Constitution of India.
10.To prepare a schedule of persons convicted under Narcotics, Drugs and Psychotropic Act statistically analyze the age group to which they belonged.
11.To study a case in which Drugs and Cosmetic Act was invoked.
12.To study a case in which Explosive Substances Act was invoked.
13.To study a case in which Arms Act was invoked.
14.In light of Section 304B of the Indian Penal Code, cite a case involving dowry death.
15.To study a case where in the Untouchability Offences Act was invoked on the basis of Article 15 of the Constitution of India.

Three year UG Course in Forensic Science
Semester – II LS/FSC/C-204 L
Core- 4
Forensic Psychology

Learning Objectives: After studying this paper the students will know –
a. The overview of forensic psychology and its applications.
b. The legal aspects of forensic psychology.
c. The significance of criminal profiling.
d. The importance of psychological assessment in gauging criminal behaviour.

Unit 1: Basics of Forensic Psychology

Definition and fundamental concepts, Forensic psychiatry, Psychology and law. Ethical issues in forensic psychology. Mental disorders and forensic psychology. Psychology of evidence – eyewitness testimony, confession evidence. Criminal profiling. Psychology in the courtroom, with special reference to Section 84 IPC (McNaughton's Rule), Durham Rule of Insanity.

Unit 2: Psychological Disorders

Classification of psychiatric disorders- Common Psychiatric Disorders- Schizophrenia, Bipolar Disorders, Anxiety Disorders, Phobia, Personality Disorder, Attention Deficit Hyperactive Disorder, Psychology of Serial murderers, terrorism. Use of Media and Intelligence for Commission of Crime. Gender Justice and Crime.

Unit 3: Juvenile delinquency

Theories of offending (social cognition, moral reasoning), Child abuse (physical, sexual, emotional), Juvenile Sex Offenders, legal controversies. Laws Related to Forensic Psychology & Competency to Stand Trial, Criminal and Civil Responsibilities.

Unit 4: Deception Detection Tools

Interviews, non-verbal detection, statement analysis, Voice stress analyser, Hypnosis, Polygraphy – operational and question formulation techniques, ethical and legal aspects, the guilty knowledge test. Narco analysis and Brain Fingerprinting – principle and theory, ethical and legal issues.

Suggested Readings

1. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4th Edition, The Foundation Press, Inc., New York (1995).

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

3. J.C. DeLadurantey and D.R. Sullivan, Criminal Investigation Standards, Harper & Row, New York (1980).

4. J. Niehaus, Investigative Forensic Hypnosis, CRC Press, Boca Raton (1999).

5. E. Elaad in Encyclopedia of Forensic Science, Volume 2, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000).

Three year UG Course in Forensic Science
Semester – II LS/FSC/C-204 P
Core - 4 Practical
Practicals based on Forensic Psychology

1. To cite a crime case where legal procedure pertaining to psychic behaviour 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 Minnesota multiphasic personality inventory test.
7. To prepare a case report on Bhatia's battery of performance test of intelligence.
8. To cite a criminal case in which narco analysis was used as a means to detect deception.

Three year UG Course in Forensic Science
Semester – III LS/FSC/C-305 L
Core - 5
Forensic Dermatoglyphics

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 by Indians.
e. The physical and chemical techniques of developing fingerprints on crime scene evidence.
f. The significance of foot, palm, ear and lip prints.

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

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

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

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

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

Three year UG Course in Forensic Science
Semester – III LS/ FSC/C-305 P
Core - 5 Practical
Practicals based on Finger Prints

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

Three year UG Course in Forensic Science
Semester – III LS/FSC/C-306 L
Core- 6
Technological Methods in Forensic Science

Learning Objectives: 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.
d. The usefulness of photography and videography for recording the crime scenes.

Unit 1: Instrumentation

Sample preparation for chromatographic and spectroscopic evidence. Chromatographic methods. Fundamental principles and forensic applications of thin layer chromatography, gas chromatography and liquid chromatography. Electrophoresis – fundamental principles and forensic applications. Neutron activation analysis – fundamental principles and forensic applications.

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.

Unit 3: Microscopy

Fundamental principles. Different types of microscopes. Electron microscope. Comparison Microscope. Forensic applications of microscopy.

Unit 4: 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.

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).

4. D.R. Redsicker, The Practical Methodology of Forensic Photography, 2nd Edition, CRC Press, Boca Raton (2000).

Three year UG Course in Forensic Science
Semester – III LS/FSC/C-306 P
Core - 6 Practical
Practicals based on Technological Methods

1. To determine the concentration of a colored compound by colorimetry analysis.
2. To carry out thin layer chromatography of ink samples.
3. To carry out separation of organic compounds by paper chromatography.
4. To identify drug samples using UV-Visible spectroscopy.
5. To take photographs using different filters.
6. To take photographs of crime scene exhibits at different angles.
7. To record videography of a crime scene.

Three year UG Course in Forensic Science
Semester – III LS/FSC/C-307 L
Core- 7
Criminalistics

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.

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. Locard 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 gemmology.

Unit 4: Trace Evidences

Fibre evidence – artificial and man-made fibres. Collection of fibre evidence. Identification and comparison of fibres. Soil evidence – importance, location, collection and comparison of soil samples. 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 Physical Evidence, 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 their Forensic 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).

Three year UG Course in Forensic Science
Semester – III LS/FSC/C-307 P
Core - 7 Practical
Practicals based on Crime scene samples

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.

Three year UG Course in Forensic Science
Semester – IV LS/FSC/C-408 L
Core - 8
Forensic Chemistry

Learning Objectives: After studying this paper the students will know –
a. The methods of analyzing trace amounts of petroleum products in crime scene evidence.
b. The methods of analyzing contaminants in petroleum products.
c. The method of searching, collecting, preserving and analyzing arson evidence.
d. The significance of bomb scene management.
f. The classification and characteristics of the narcotics, drugs and psychotropic substances.

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.

Unit2: Petroleum Products and Edible oil

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 3: Cases Involving Arson

Chemistry of 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. Scientific investigation and evaluation of clue materials. Information from smoke staining. Identification of corrosive acid in Vitriol Throwing (Vitriolage) cases,

Unit 4: Explosives

Classification of explosives – low explosives and high explosives. Homemade explosives. Military explosives. Blasting agents. Pyrotechniques, Synthesis and characteristics of TNT, PETN and RDX. Explosion process. Bomb scene management. Searching the scene of explosion. Post blast residue collection and analysis. Blast injuries. Detection of hidden explosives.

Suggested Readings:

1.Khan, JaVed I., Ho, Mat H. Analytical Methods in Forensic Chemistry. New York: Working Procedure Manua Chemistry/Toxicology/Explosives/Narcotics, DFS Pub. New Delhi

2. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4th Edition, The Foundation Press, Inc., New York (1995).
3. R. Saferstein, Criminalistics, 8th Edition, 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 (2013).
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 (2013).
6. Kennedy, Thomas J., Christian, Jr., Donnell Basic Principles of Forensic Chemistry,Springer
7. J.D. DeHaan, Kirk's Fire Investigation, 3rd Edition, Prentice Hall, New Jersey (1991)
8. Goutam, M. P. and Goutam S Analysis of Plant Poison, Selective & Scientific Books, New Delhi.
9. Feigl; Spot Test in Organic Analysis, Elsevier Pub., New Delhi.
10. Curry A.S; Analytical Methods in Human Toxicology, Part II, CRC Press Ohio
11.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
13.Michael J. Deverlanko et al: Hand Book of Toxicology CRC Press, USA.
14.Parikh C.K; Text Book of Medical Jurisprudence Forensic Medicines and Toxicology. CBS Pub. New Delhi.
15.Balraj S. Parmar et al; Pesticide Formulation, CBS Publishers, New Delhi.

Three year UG Course in Forensic Science
Semester – IV LS/ FSC/C-408 P
Core - 8 Practical
Practicals based on Forensic Chemistry

1.To carry out analysis of gasoline.

2.To carry out analysis of diesel.

3.To carry out analysis of kerosene oil.

4.To analyze arson accelerators.

5.To prepare a case report on a case involving arson.

6.To carry out analysis of explosive substances.

7.To separate explosive substances using thin layer chromatography.

8.To prepare a case report on bomb scene management.

Three year UG Course in Forensic Science
Semester – IV LS/FSC/C-409 L
Core- 9
Questioned Documents

Learning Objectives: After studying this paper the students will know –
a. The importance of examining questioned documents in crime cases.
b. The tools required for examination of questioned documents.
c. The significance of comparing hand writing samples.
d. The importance of detecting frauds and forgeries by analyzing questioned documents.

Unit 1: Nature and Scope of Questioned Documents

Definition of questioned documents. Types of questioned documents. Preliminary examination, Collection, Handling and Transportation of document. Examination of computer generated, typed and Xeroxed documents. Determining the age of documents.

Unit 2: Handwriting and its Comparison

Handwriting and its Principles. Comparison of handwriting.. Natural variations and fundamental divergences in handwritings. Class and individual characteristics. Request and Standard Documents. Examination of signatures characteristics, Examination of paper and ink

Unit 3: Forgeries

Types of Forgery and its examination. Alterations in documents. Indented and invisible writings. Charred documents. Disguised writing and anonymous letters. . Examination of counterfeit Indian currency notes, passports, visas and stamp papers, seal, rubber & other mechanical impressions.

Unit 4: Basic tools for examination of Documents

Basic tools needed for forensic documents' examination. Ultraviolet, Visible and Fluorescence Spectroscopy. Photomicrography , Microphotography. Video Spectral Comparator, Electrostatic Detection 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 Civil and Criminal Cases, 4th Edition, 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, 2nd Edition, Taylor & Francis, Hants (1997).

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

6.Wilson R. Harrison; Suspect Documents Their Scientific Examination.

7.Saferestein, Criminalistics: An Introduction to Forensic Science. Prentice, Hall.

8.Sharma, B.R.: Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad, 1974.

9. Roy A Huber, A.M. Headrick; Handwriting Identification- Facts and

10.Laboratory working procedure manual, Documents DFS, New Delhi,2005

11.Fundamental, CRC Press identification, profusely illustrated, Law Book, Allahabad Universal Law Pub. Delhi Indian

Three year UG Course in Forensic Science
Semester – IV LS/FSC/C-409 P
Core - 9 Practical
Practicals based on Questioned Documents

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.

9.To cite a case wherein Section 45 of Indian Evidence Act was invoked, seeking expert opinion for authentication of handwriting and/or signatures.

10.To cite a case wherein Section 489A of the Indian Penal Code was invoked in context of fake currency.

11.Examination of Secret and Indented writing.

Three year UG Course in Forensic Science
Semester – IV LS/FSC/C-410 L
Core- 10
Forensic Biology

Learning Objectives: After studying this paper the students will know –
a. The significance of biological and serological evidence.
b. The forensic importance of hair evidence.
c. The importance of biological fluids – blood, urine, semen, saliva, sweat and milk – in crime investigations.
d. How wildlife forensics aid in conserving natural resources.
e. How forensic entomology assists in death investigations.

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 wildlife forensics. 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 Forensic Sciences, 2nd Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).

Three year UG Course in Forensic Science
Semester – IV LS/FSC/C-410 P
Core - 10 Practical
Practicals based on Forensic Biology

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 cite a crime case in which diatoms have served as forensic evidence.
7. To prepare a case report on forensic entomology.
8. To prepare a case report on problems of wildlife forensics.

Three year UG Course in Forensic Science
Semester – V LS/FSC/C-511 L
Core- 11
Forensic Ballistics

Learning Objectives: After studying this paper the students will know –
a. The classification of firearms and their firing mechanisms.
b. The methods of identifying firearms.
c. The characteristics of ammunition.
d. The importance of firearm evidence.
e. The nature of firearm injuries.
f. The methods for characterization of gunshot residue.

Unit 1: Introduction to Firearm

History and development of firearms. Classification of firearms. Weapon types and their operation. Firing mechanisms of different firearms.

Unit 2:Internal/External/Terminal Ballistic

Internal ballistics – Definition, ignition of propellants, shape and size of propellants, manner of burning, and various factors affecting the internal ballistics: lock time, ignition time, barrel time, erosion, corrosion and gas cutting. External Ballistics –Measurements of trajectory parameters, introduction to automated system of trajectory computation and automated management of ballistic data. Terminal Ballistics – Effect of projectile on hitting the target: function of bullet shape, striking velocity, striking angle and nature of target, tumbling of bulletsRicochet and its effects, stopping power.

Unit 3: Ammunition

Types of ammunition. Constructional features and characteristics of different types of cartridges and bullets. Primers and priming compounds. Projectiles, Headstamp markings on ammunitions. Different types of marks produced during firing process on cartridge – firing pin marks, breech face marks, chamber marks, extractor and ejector marks.

Unit 4: Firearm Evidence

Matching of bullets and cartridge cases in regular firearms. Identification of bullets, pellets and wads fired from improvised, country made firearms. Automated method of bullet and cartridge case comparison. Determination of range of fire and time of fire. Mechanisms of formation of gunshot residues. Methods of analysis of gunshot residues from shooting hands and targets, with

special reference to clothings. Identification and nature of firearms injuries. Reconstruction with respect to accident, suicide, murder and self defence.

Suggested Readings

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 in Encyclopedia of Forensic Science, Volume 2, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000).

Three year UG Course in Forensic Science
Semester –V LS/FSC/C-511 P
Core - 11 Practical
Practicals based on Forensic Ballistics

1. To describe, with the aid of diagrams, the firing mechanisms of different types of firearms.
2. To correlate the velocity of bullet with the impact it produces on the target.
3. To correlate the striking angle of the bullet with the impact on the target.
4. To estimate the range of fired bullets.
5. To carry out the comparison of fired bullets.
6. To carry out the comparison of fired cartridge cases.
7. To identify gunshot residue.
8. To correlate the nature of injuries with distance from which the bullet was fired.
9. To differentiate, with the aid of diagram, contact wounds, close range wounds and distant wounds.

Three year UG Course in Forensic Science
Semester –V LS/FSC/C-512 L
Core- 12
Forensic Toxicology

Learning Objectives: After studying this paper the students will know:
a. The significance of toxicological studies in forensic science.
b. The classification of poisons and their modes of actions.
c. The absorption of poisons in body fluids.
d. The forensic identification of illicit liquors.
e. The classification and characteristics of the narcotics, drugs and psychotropic substances.

Unit 1: 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 2: 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 isolation of poison from viscera

Unit 3: 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.

Unit 4: Identification and Analysis of Drugs

Drug: Definition, Classification and Identification of NDPS, Narcotics, stimulants, depressants and hallucinogens, General characteristics and common example of natural, synthetic and semi-synthetic narcotics, drugs and psychotropic substances, Designer drugs, Drugs and driving. Dope tests.

Suggested Readings

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.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).
5.Kennedy, Thomas J., Christian, Jr., Donnell Basic Principles of Forensic Chemistry, Springer
6.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.
9.Goutam, M. P. and Goutam S Analysis of Plant Poison, Selective & Scientific Books, New Delhi.
10.Feigl; Spot Test in Organic Analysis, Elsevier Pub., New Delhi.
11.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
13.Michael J. Deverlanko et al: Hand Book of Toxicology CRC Press, USA.
14.Parikh C.K; Text Book of Medical Jurisprudence Forensic Medicines and Toxicology. CBS Pub. New Delhi.
15.Robert J. Flanagan, Andrew A. Taylor, Ian D. Watson, Robin Whelpton Fundamentals of Analytical Toxicology, Wiley.
16.Bamford Frank. Poisons- their isolation and identification, J &.A Churchill Ltd

Three year UG Course in Forensic Science
Semester –V LS/FSC/C-512 P
Core - 12 Practical
Practicals based on Forensic Toxicological analysis

1.To identify biocides.
2.To identify metallic poisons.
3.To identify organic poisons.
4.To identify ethyl alcohol.
5.To identify methyl alcohol.
6.To carry out quantitative estimation of ethyl alcohol.
7.To prepare iodoform.
8.To identify drugs of abuse by spot tests.
9.To perform color tests for barbiturates.
10. To separate drugs of abuse by thin layer chromatography.

Three year UG Course in Forensic Science
Semester – VI LS/FSC/C-613 L
Core- 13
Forensic Anthropology

Learning Objectives: After studying this paper the students will know –
a. Importance of forensic anthropology in identification of persons.
b. Different techniques of facial reconstruction and their forensic importance.
c. Significance of somatoscopy and somatometry.

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/identi kit. Facial superimposition techniques. Cranio facial super imposition techniques – photographic super imposition, videosuperimposition, 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

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).

Three year UG Course in Forensic Science
Semester –VI LS/FSC/C-613 P
Core - 13 Practical
Practicals 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.

Three year UG Course in Forensic Science
Semester –VI LS/FSC/C-614 L
Core- 14
Forensic Medicine

Learning Objectives: After studying this paper the students will know –
a. The duties of the first responding officer who receives a call on homicide or suicide case.
b. The steps involved in processing the death scene.
c. The importance of ascertaining whether the crime was staged to appear as suicide or accident.
d. The importance of bloodstain patterns in reconstructing the crime scene.
e. The importance of autopsy.
f. The importance of forensic odontology

Unit 1: Medical Jurisprudence

Definition, aims, concept, fundamental aspects and scope of medical Jurisprudence, Legal procedure in criminal court, Medical evidence and medical witness, Legal aspects of medical practices, Medical negligence, Consent in medical practices.

Unit 2: Autopsy

Objectives of Autopsy, Rules for medico-legal Autopsies,Medico-legal verus Hospital Autopsy, Autopsy report, Procedure of Autopsy: laboratory procedure, Second Autopsy, obscure Autopsy, Preservation of dead bodies, Handling of highly infected bodies, Psychological Autopsy, Artifacts.

Unit 3: Death and its Investigation

Death: definition, classification, mode, manner and causes of death, Exhumation, Determination of time since death, Investigation of Asphyxial death, Death due to drowning. Investigation of sexual offences

Unit 4: Injuries and its Examination:

Injuries: Definition, types and classification, Injuries due to burns and scald, lightning and electricity, Radiation Injuries, Mechanical injuries, Bomb blast and explosion injuries, Traffic injuries and Regional injuries, Ante mortem and post mortem injuries, Aging of injuries, Artificial injuries.

Suggested Readings

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 (2013)

Three year UG Course in Forensic Science
Semester –VI LS/FSC/C-614 P
Core - 14 Practical
Practicals 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.

Three year UG Course in Forensic Science
Semester – ILS/FSC/GE-101L
Generic Elective-1
Elementary Forensic Science

Unit I: Elementary Forensic Science

Forensic Science and its branches, Principles of Forensic Science; Scene of Crime – Types, Sketching and Searching methods, Chain of custody; Collection, packing and forwarding of Physical evidences; Forensic Experts; Introduction to IPC, IEA, CrPC.

Unit II: Criminology and Police Science

Crime and Criminal, Criminology and Penology; Classification of Offences under IPC; Police Science and Organizational structure of Police; State Armed Force (SAF), Home Guard, Research and Analysis Wing (RAW), CID, CBI, BPR&D and Interpol.

Unit III: Finger Prints and Questioned Documents

Questioned Documents: Definition, Classification Types, Principles of Hand writing Identification and its Characteristics Fingerprints: History, Classification, Development, Pattern, Types and characteristics for personal identification.

Unit IV: Cyber Forensics

Cyber Forensic, Cyberspace, Computer crime, LAN,WAN, MAN, IT ACT 2000, OSI Model, Basic principle of security, Active attack, Passive attack, Basic of Forensic Speaker Identification, Hacking and Types of Hackers, Basic of Cryptography and Stegnography.

Recommended Books:

1. Hilton; O. Scientific Examination of Questioned Documents, Elsevier, NY.
2. Albert S. Osborn; Questioned Documents, 2nd Ed., Universal Law Pub., Delhi.
3. Wilson R. Harrison; Suspect Documents Their Scientific Examination.
4. Saferestein, Criminalistics: An Introduction to Forensic Science. Prentice, Hall.
5. Sharma, B.R.: Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad, 1974.
6. Relevant sections of Information technology Act 2000.

7. Esharenana, Adoni, Frame works for ICT Policy Government, Social and Legal Issues. Information Science Reference, Harsey, New YORK.

8. Robert C. Newman ,Computer Forensics: Evidence Collection and Management Auerbach Publications.

9. Eoghan Casey , Handbook of Computer Crime Investigation: Forensic Tools and Technology Academic Press

10. Clark, Franklin, and Diliberto, Ken, (1996). Investigating computer Crime, CRC Press, Boca Raton, Florida, USA

Three year UG Course in Forensic Science
Semester – ILS/ FSC/GE-101P
Generic Elective -1 Practical
Practicals based on Crime Scene Investigation

1. Sketching and Photography of Crime scene.
2. Searching and collection of physical evidence at crime scene.
3. Recording and Identification of Fingerprints.
4. Development of latent finger print on glass, paper, polished surface.
5. Examination of Erasures on Questioned document
6. Comparison of Handwriting and Signatures.
7. Imaging of hard disc, restoration of deleted file.
8. Password cracking and e-mail tracking.

Three year UG Course in Forensic Science
Semester – II LS/FSC/GE-202 L
Generic Elective-2
Applied Forensic Science

Unit I: Forensic Biology

Preliminary and Confirmatory examination of Blood, Saliva, Semen, Urine and its Forensic Significance. Microscopic examination of Human and Animal Hair, Importance of Wild Life Forensics and Identification of Pug marks of various animals. DNA Fingerprinting in Forensic Science.

Unit II: Forensic Medicine and Toxicology:

Poisons–Definition, Scope, Classification, Legislations concern to poisoning in India, Medico-legal Autopsy, Medico-legal Report, P M Findings in unnatural death, Introduction to methods of isolation of poison from Viscera, Collection and Preservation of viscera in fatal cases.

Unit III: Forensic Chemistry

Definition and Scope, Examination of Fire and Arson, Country made and Illicit liquor, Vitriolage cases, Analysis of Petrol and Diesel, Drugs: Definition, Classification and legislations, Introduction to Narcotic, Depressants, stimulants, and Hallucinogens, Designer Drugs & Nootropics.

Unit IV: Forensic Ballistics

Ballistics: Definition and scope, Firearms: Definition, Classification and Characteristics, Ammunition: Definition as per Indian Arms Act and classification, General Introduction to explosives.

Recommended Books

1. Richard Saferstein; Forensic Science Hand Book, Vol II Prentice Hall, Englewood Cliff, NJ.

2. Goutam Shubhra. ; An Introduction to Forensic Hair Examination; Selective and Scientific Book, New Delhi

3. Saferstein R. – Criminalistics Prentice Hall, Inc, New York.

4. Working procedure manual: Biology/ Serology; DFS, New Delhi

5. Saferestein, Criminalistics: An Introduction to Forensic Science. Prentice Hall

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

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

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

9. Arms Acts, 1959 and Arms Rule, 1962.

10.Working procedure Manual: Ballistics, DFS New Delhi, Publication, 2005.

11.Sharma, B.R.: Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad, 1974.

Three year UG Course in Forensic Science
Semester – II LS/ FSC/GE-202 P
Generic Elective -2 Practical
Practicals based on Applied Forensic Science

1. Characterization of blood by Presumptive test and Crystallization assay
2. Identification of Saliva, Semen, Urine by Preliminary tests.
3. Analysis of narcotic drugs.
4. Identification of Dhatura alkaloids by TLC
5. Determination of methanol and ethanol in liquor sample.
6. Detection of adulterant in vegetable oil
7. Identification of firearms, cartridges, bullets, gunpowder, etc.
8. Matching bullets and cartridge cases by comparison microscope.

Three year UG Course in Forensic Science
Semester – III LS/FSC/GE-303 L
Generic Elective-3
Crime Scene Management

Unit I: Crime Scene Management

Introduction to Crime scene investigation, Types of Crime scene, Locard's Exchange Principle, Expert's Team composition, Methodological Approach to processing the Crime scene, Sketching and mapping, Role of First responding Officer.

Unit II:Processing a Crime Scene

History and Development of Forensic Science, Basic Principles of Forensic Science, Organizational structure of Forensic Science Laboratories at State and Central level, White Collar crime, Organized Crimes, Economic crimes, Cyber crimes, Crime against children and Women.

Unit III: Searching the Crime Scene

Searching the Crime scene, Types of Searches, Zone Search: Ever Widening, Circle Strip Search, and Grid Search, Indoor searches and outdoor searches, searching of pattern and marks, Collection.

Unit IV: Collection and Packaging of evidence

Physical Evidences: Collection, Packaging and Forwarding of different types of evidences to the laboratories, Techniques for Handling Evidence, Biological evidence, Impression Evidence, Firearms and Ballistic Evidence, Drug Evidence, Toxicological Evidences.

Recommended Books:

1. Sharma, B.R.: Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad, 1974.
2. Saferstein: Forensic Science Handbook, Vol I, II & III, Prentice Hall Inc. USA.
3. Saferstein: Criminalistics, 1976, Prentice Hall Inc. USA.
4. Siegel, J. A., Saukko, P. J. And Knupfer, G.C., Encyclopedia of Forensic Sciences, Academic Publishers, London .

5. Barry,A.J.Fisher.; Techniques of Crime Scene Investigation,6th Edition Ed, C.R.C Press NY(2003)

6. Nordby, J Deed Reckoning ; The Art of Forensic Detection, CRC Pre LLC(2000)

7. Eckett, W.G & James S.H; Interpretation of Bloodstains, Evidence of Crime Scene, Elsevier Pub. NY (1989)

Three year UG Course in Forensic Science
Semester – III LS/ FSC/GE-303 P
Generic Elective -3 Practical
Practicals based on Crime Scene Management

1. Reconstruction of crime scene.
2. Searching of physical evidence at crime scene.
3. Collection, packing and preservation of Physical evidences
4. Lifting of prints and impressions by caste and replicas.
5. Evaluation of Crime scene and photographs.
6. Sole prints comparison and their lifting from the scene of crime.

Three year UG Course in Forensic Science
Semester – IV LS/FSC/GE-404 L
Generic Elective-4
Advanced Forensic Science

Unit I: Forensic psychology

Forensic psychology, Importance of forensic psychology, Role of forensic psychology in Civil and Criminal cases, Modus Operandi and its role in criminal investigations, criminal profiling, methods of investigations, Narco analysis, Hypnosis, Brain Fingerprinting.

Unit II: Wildlife Forensics

Introduction to Wild life Forensics, Protected and endangered species of Animals and Plants, Identification of wild life materials, Identification of Pug marks of various animals, Forensic (medico-legal) necropsy of wildlife,Identification of Pollen grains.

Unit III: Forensic Anthropology

Definition and Scope, Identification of different types of bones, Age and gender determination from skull, Pelvis, and skeletal remains, Significance of Somatoscopy, Somatometery, Osteometery and Craniometery in Personal Identification.

Unit IV: Forensic Genetics

General principles of DNA extraction and PCR, Personal identification techniques - PCR, RFLP, Y-STR, Mitochondrial DNA, DNA profiling applications in disputed paternity cases, child swapping, missing person's identity.

Recommended Books:

1. Encyclopedia of criminal and deviant behavior (2001) Cliffon D. Pryart, Editor in chief rout ledge, Taylor and Francis group.
2. David Canter, Forensic Psychology, Oxford University Press.
3. Irving B. Weiner, Allen K. Hess. The Handbook of Forensic Psychology. John Wiley & Sons.
4. Denis Howitt. Introduction to forensic and criminal psychology . Pearson Education, Ltd.
5. Jane E. Huffman, John R. Wallace Wildlife Forensics: Methods and Applications, Wiley Blackwell.

6. Vincent J. M. Di Maio, Suzanna E. Dana Handbook of forensic pathology CRC/Taylor & Francis.

7. Krogman, W.M. And Iscan, M. (1987): Human Skeleton in Forensic Medicine Charles & Thomas, U.S.A.

8. Nath,S An Introduction to Forensic Anthropology.Gian Publishing House, New Delhi.

9. A Seigel, P.J Saukoo and G C Knupfer; Encyclopedia of Forensic Sciences Vol. I, II and III, Acad. Press (2000)

10. Beals, R.L. and Hoizer, H. (1985): An introduction to Anthropology, Macmillan, New Delhi.

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

12. William Goodwin, Adrian Linacre, SibteHadi; An introduction to forensic genetics John Wiley &son's ltd, UK.

13. John M. Butler. Forensic DNA Typing, Second Edition: Biology, Technology, and Genetics of STR Markers Elsevier Academic Press.

14. Siegel, J.A., Saukko, P.J., Knupfer, G. C., Encyclopedia of Forensic Science, Academic Press, London, 2000.

15. Evett, I.W. & Weir, B.S. 1998 Interpreting DNA Evidence: Statistical Genetics for Forensic Scientists. Sunderland Mass: Sinauer.

Three year UG Course in Forensic Science
Semester – IV LS/ FSC/GE-404 P
Generic Elective -4 Practical
Practicals based on Advanced Forensic Science

1. Identification of pollen grains
2. Identification of Pug marks of animals
3. Determination of sex from Skull Sutures & Pelvis
4. Determination of age from teeth & Skull
5. DNA extraction of conventional method
6. DNA typing by PCR

Three year UG Course in Forensic Science
Semester –V LS/FSC/DSE-501(A)-L
Discipline Specific Elective (DSE 1 - A)
A. Digital Forensics

Credits: 4

Learning Objectives: After studying this paper the students will know –
a. The basics of digital forensics.
b. The cases which fall under the purview of digital crimes.
c. The types of digital crimes.
d. The elements involved in investigation of digital crimes.

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).

Three year UG Course in Forensic Science
Semester – V LS/FSC/DSE-501(A)-P
Discipline Specific Elective Practical
A. Practicals based on Digital Forensics

Credits: 2

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 use digital signatures for securing e-mail and online transactions.
9. To acquire data from PCs/laptops/HDDs/USBs, pen drives, memory cards and SIM cards.
10. To use symmetric and asymmetric keys for protection of digital record.
11. To carry out imaging of hard disks.

Three year UG Course in Forensic Science
Semester – V LS/FSC/DSE-501(B)-L
Discipline Specific Elective (DSE 1 - B)
B. Economic offences

Credits: 4

Unit 1: Taxonomy of Economic Offences/Criminogenic Factors

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. 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 2: Applied Economics in Processing Evidence

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

Unit 3: 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.

Unit 4: Legal recognition of Economic Crimes

Relevent Section related to Economic Crimes: Intellectual property crime, Corruption and bribery of public servants. Money laundering and hawala transactions. Insurance frauds. Corporate frauds. Bank frauds. Illicit trafficking in contraband goods.

Suggested Readings

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.

Three year UG Course in Forensic Science
Semester – V LS/FSC/DSE-501(B)-P
Discipline Specific Elective Practical
B. Practicals based on Economic offences

Credits: 2

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 study the applications of TELLY software.
8. To review the legislative measures to deal with a particular economic offence, identifying the loopholes and suggesting ways to plug the loopholes.
9. To prepare a schedule of national agencies involved in curbing economic offences. Outline their specific duties.

Three year UG Course in Forensic Science
Semester –V LS/FSC/DSE-502(A)-L
Discipline Specific Elective (DSE 2 - A)
A. Forensic Serology

Credits: 4

Learning Objectives: After studying this paper the students will know –
a. The significance of serological evidence.
b. The importance of biological fluids – blood, urine, semen, saliva, sweat and milk – in crime investigations.
c. The usefulness of genetic markers in forensic investigations. d. The forensic importance of bloodstain patterns

Unit 1: Forensic Importance of Body fluids

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.

Unit 2: Composition and Functions of Body fluids.

Semen. Forensic significance of semen. Composition, functions and morphology of spermatozoa. Collection, evaluation and tests for identification of semen. Individualization on the basis of semen examination. Composition, functions and forensic significance of saliva, sweat, milk and urine. Tests for their identifications.

Unit 3: 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.

Unit 4: Biochemical Markers Analysis

Cellular antigens, ABO blood groups, Extracellular proteins and intracellular enzymes, Typing of Biochemical Markers, Forensic Significance of Biochemical markers for identification and individualization.

Suggested Readings

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. T. Bevel and R.M. Gardner, Bloodstain Pattern Analysis, 3rd Edition, CRC Press, Boca Raton (2008).

5. Anita Y. Wonder. Bloodstain Pattern. Elsevier, London.

Three year UG Course in Forensic Science
Semester –V LS/FSC/DSE-502(A)-P
Discipline Specific Elective Practical
A. Practicals based on Forensic Serology

Credits: 2

1. To determine blood group from fresh blood samples.
2. To determine blood group from dried blood sample.
3. To carry out the crystal test on a blood sample.
4. To identify blood samples by chemical tests.
5. To identify the given stain as saliva.
6. To identify the given stain as urine.
7. To carry out cross-over electrophoresis.
8. To study the Blood Pattern Analysis.

Three year UG Course in Forensic Science
Semester –V LS/FSC/DSE-502(B)-L
Discipline Specific Elective (DSE2 - B)
B. Accident Investigations

Learning Objectives: After studying this paper the students will know
a. The significance of photographs in accident cases.
b. The importance of trace evidences
c. The consequences of Accident analysis

Credits: 4

Unit 1: Motor Vehicle Accidents

Accident scene, Sources of forensic information, Eyewitness accounts, Extent of vehicle damage, Visibility conditions, Photographs of accident site.

Unit 2: Surface Markings during RTA Cruses

Tire marks, skid marks, scuff marks etc; Maintenance of vehicles, abandoned vehicles, Importance of air bags, Railway accidents, Estimation of speed.

Unit 3: 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 4: 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.

Suggested Readings

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).

Three year UG Course in Forensic Science
Semester –V LS/FSC/DSE-502(B)-P
Discipline Specific Elective Practical
B. Practicals based on Accident Investigations

1. To lift tiremarks.
2. To study the pattern of skidmarks.
3. To study the pattern of scuffmarks.
4. To estimate the speed of the vehicle from skidmarks.
5. To prepare a report on a major roadaccident.
6. To prepare a report on a major trainaccident.

Three year UG Course in Forensic Science
Semester –VI LS/FSC/DSE-603(A)-L
Discipline Specific Elective (DSE 2 - A)
A. DNA Typing

Learning Objectives: After studying this paper the students will know –
a. The basic principle of DNA analysis.
b. The forensic significance of DNA typing.
c. The importance of short tandem repeats and restriction fragment length polymorphism in DNA technique.
d. Role of DNA typing in parentage testing.

Unit 1: Basic Principles

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

Unit 2: Forensic DNA Typing

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

Unit 3: Parentage Testing

Principles of heredity. Genetics of paternity. DNA testing in disputed paternity. Mandelian laws of parentage testing. Mathematical basis of parentage identification. Missing body cases. Reference populations and databases.

Unit 4: Report writing

Report Writing: Role of DNA typing in identifying unrecognizable bodies.
Allele frequency determination. Hardy-Weinberg law. Probability determination in a population database.

Suggested Readings

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 (2013).

Three year UG Course in Forensic Science
Semester –VI LS/FSC/DSE-603(A)-P
Discipline Specific Elective Practical
A. Practicals based on DNA Typing

1. To carry out the separation of amino acids by thin layer chromatography.
2. To carry out *extraction of DNA from body fluids.*
3. To preparation of gel plates for electrophoresis.
4. To carry out electrophoresis for separation of enzymes.
5. To prepare a report on the role of DNA typing in solving paternity disputes.

Three year UG Course in Forensic Science
Semester –VI LS/FSC/DSE-603(B)-L
Discipline Specific Elective (DSE2 - B)
B. Modern Forensic Toxicology

Learning Objectives: After studying this paper the students will know:
a. The significance of various fundamental approaches of toxicology in forensic science.
b. The importance of an assortment of environmental issues concern with the field of toxicology.
c. The implications of different aspects of industrial forensic toxicology.
d. The forensic identification of various types of households poisons and its forensic utility.
e. The different forensic episodic events concern with work place coincidences such as Laboratory, hospital's OT, Clinics, OPDs and medico-legal Autopsy center etc.

Unit-I: Environmental Forensic Toxicology:

Concept, Definition, Scope and Forensic Significance, Forensic laws and policies Modes of toxic action, Measurement of toxicants and toxicity, Chemical use classes, Dose Response Relationship, Sources of toxic compounds, Movement of toxic compounds in the Environment.

Unit-II: Industrial Forensic Toxicology:

Concept, Definition, Scope and Forensic Significance, Forensic laws and policies, types of pollution and pollutants, Common industrial poisons, Industrial hygiene and toxicity, Management of Industrial effluents, Safety and applications at workplace.

Unit-III: Household Poisoning:

Concept, Definition, Scope and Forensic Significance, existing legislations, common house hold poisons: properties, Classification and mode of action, direct and indirect effects on human health.

Unit-IV: Workplace Poisoning:

Concept, Definition, Scope and Forensic Significance, Important regulations and policies, Common occupational poison and hazards, Chemical hazards of work place, direct and indirect effects on human health.

Suggested readings:

1. Environmental toxicology: biological and health effects of pollutants MH Yu, H Tsunoda,-2000.

2. Introduction to environmental toxicology: impacts of chemicals upon ecological systems: W Landis&R Sofield,-2003.

3. PAHs: an ecotoxicological perspective: PET Douben,-2003.

4. Environmental toxicology and risk assessment of pharmaceuticals from hospital wastewater: BI Escher & R Baumgartner,-2011.

5. Handbook of industrial toxicology: by ER Plunkett,-1976.

6. Industrial Toxicology: by LTFairhall,-1949.

7. Industrial Toxicology: Safety and health applications in the workplace: by PL Williams& JL Burson,-1985.

8. Hamilton and Hardy's industrial toxicology: by AJ Finkel,-1983.

9. Patty's industrial hygiene and toxicology: Vol. III. Theory and rationale of industrial hygiene practice. by LV Cralley& LJ Cralley,-1979.

10. Earth house hold: by G Snyder,-1969.

11. Poison centers, poison prevention, and the pediatrician: by FH Lovejoy &WO Robertson,-1994.

12. Unintentional household poisoning in children: by S Meyer&B Bailey,-2007.

13. House and hand dust as a potential source of childhood lead exposure: by JW Sayre & E Charney,-1974.

14. Pesticides in household dust and soil: exposure pathways for children of agricultural families. by NJ Simcox& RA Fenske,-1995.

15. Proctor and Hughes' chemical hazards of the workplace: by NH Proctor & JP Hughes,-2004.

16. Plant micro-technique and microscopy: by SE Ruzin,-1999.

Three year UG Course in Forensic Science
Semester –VI LS/FSC/DSE-603(B)-P
Discipline Specific Elective Practical
B. Practicals based on Modern Forensic Toxicology

1. Analysis of liquor as per BIS specifications.
2. Analysis of gasoline as per BIS specifications.
3. Analysis of explosive residues (Qualitative only).
4. Identification of vegetable poisons through microscopy.
5. M.P, B.P and flash point Determination.
6. Color/spot tests for common drugs of abuse.
7. TLC separation of drugs of abuse.