

**Department of Forensic Science**  
**Guru Ghasidas Vishwavidyalaya**  
**Bilaspur (C. G)**

**B.Sc Forensic Science**

<b>Semester</b>		<b>Paper</b>
<b>Semester 1</b>	Core 1	Introduction to Forensic Science
	Core 2	Crime and Society
	Generic Elective 1	Elementary Forensic Science
<p><b>Course Specific Outcome:</b> In the First Semester Students will learn about the basic principles of Forensic Science, different branches, functions, nature and scope of Forensic Science. Role of Police in Crime Scene investigations. Basics of Criminology, different theories of criminal behaviour, Classification of crime and Criminals. Human rights and Criminal justice system. The detail study will help to understand about the basics and different branches of Forensic Sciences.</p>		
<b>Semester 2</b>	Core 3	Criminal Law
	Core 4	Forensic Psychology
	Generic Elective 2	Applied Forensic Science
<p><b>Course Specific Outcome:</b> In the Second Semester Introduction to IPC, CrPC, IEA, relevant sections, Essential elements of Criminal law, Expert witness testimony. The detailed description of narcotics drugs and their relevant acts. Fundamental concepts of Forensic psychology and psychiatry, mental disorders, criminal profiling, different types of psychiatric disorders, modern techniques to deal with the criminals. Upon completion of this semester Students will learn about the brief description of criminal law and the relevant sections, the modern usages of criminal profiling.</p>		
<b>Semester 3</b>	Core 5	Forensic Dermatoglyphics
	Core 6	Technological Methods in Forensic Science
	Core 7	Criminalistics
	Generic Elective 3	Crime Scene Management
	Skill Enhancement 1	Introduction to Biometry
<p><b>Course Specific Outcome:</b> The Fingerprints and advance instrumentation techniques, Crime scene management will be the highlights of this course. The basics, history, development methods of fingerprints, types of fingerprint evidences and Automated fingerprint identification system. Fundamental principles of microscopy, different types of microscopes, chromatographic and spectroscopic instrumentation, principles of Electrophoresis and Neutron activation analysis, principle and applications of photography, digital photography, Infra red and ultra violet photography. Collection, packaging and preservation of physical evidences, Indoor and outdoor crime scenes, trace evidence collections are the key topics Students get aware with this course.</p>		
<b>Semester 4</b>	Core 8	Forensic Chemistry
	Core 9	Questioned Documents
	Core 10	Forensic Biology
	Generic Elective 4	Advanced Forensic Science
	Skill Enhancement 2	Handwriting Identification and Recognition
<p><b>Course Specific Outcome:</b> Scope and usages of Forensic Chemistry, Biology and Questioned</p>		

documents are the outcome of this course. Analytical methods to analyse Narcotic drugs, Hallucinogens and different types of drugs, collection and preservation of petroleum products and arson evidences, classification of different types of explosives. Analysis of Questioned documents, principles, natural variations and individual characteristics of handwriting. Types of Forgeries, Invisible inks usages, Disguised letters, Usages of advance instruments in examination of handwritings. Nature and importance of biological evidences, How to confirm the origin of blood and seminal stains, morphology and identification of diatoms and pollen grains. Fundamentals of Wild life Forensics and Forensic Entomology, Forensically importance of different types of insects are the key issues to be capture in this course.

<b>Semester 5</b>	Core 11	Forensic Ballistics
	Core 12	Forensic Toxicology
	Discipline Specific 1	Digital Forensics
		Economic Offences
	Discipline Specific 2	Forensic Serology
Accident Investigations		

**Course Specific Outcome:** Ballistics, Toxicological and Anthropological evidences are the key issues to address in this course. Classification of fire arms, firing mechanisms, Internal, external and terminal ballistics, types of ammunitions, matching of bullets and cartridges, Identification of bullets, wads and pellets. Significance of Toxicological evidences, Dose response and lethal dosages, poisons and their mode of actions, identification and their analysis, suicidal, homicidal and accidental poisoning, identification and analysis of drugs, classification of narcotics, stimulants, depressants and hallucinogens are some of the subject of interest will be addressed in this course.

<b>Semester 6</b>	Core 13	Forensic Anthropology
	Core 14	Forensic Medicine
	Discipline Specific 3	DNA Typing
		Modern Forensic Toxicology
	Dissertation/Project Work	

**Course Specific Outcome:** Introduction and significance of Anthropology, Osteology, Somatoscopy and Somatometry, Role and significance of Forensic Odontology, dental patterns and bite marks. Personal identification from bones and teeth's, facial reconstruction and facial superimposition techniques. Fundamental aspects and scope of medical jurisprudence, rules of medico legal autopsies, mode and manner of death, different types of injuries will be the topics of subject.

Basic principles of DNA extraction, Forensic DNA typing and genetic markers and parentage testing.

Toxicants and toxicity, Industrial Forensic Toxicology, classification and mode of poisons students will get aware with the different branches of Forensic Science.

Students need to

## **Program specific outcome of B.Sc. in Forensic Science**

With the advancements in Forensic Science and technology, law enforcement agencies have more resources to deal with the criminals and their actions, as a result the demand for Forensic Science has increased. B.Sc in Forensic Science (3 years programme) is an application based programme where all the basic Science subjects Biology, Chemistry, Physics, Mathematics are applied for the Scientific investigation of the crime. It is a multidisciplinary subject which deals with the different branches of Science as well as law, Police and Medicine.

After completion of this course students will learn to the evaluation of 5Ws (who? what? when? where? why?) and 1H (how?).

**Proposed Syllabus for  
3 Years UG Programme  
In  
Forensic Science**

**SCHEME OF EXAMINATION**

**Forensic Science**

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

**UG COURSE IN FORENSIC SCIENCE  
(THREE YEARS / SIX SEMESTERS)**

### 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	Practical's based on Crime Scene	2	4
	Core -2	LS/ FSC/C-102L	Crime and Society	4	4
	Core -2 Practical	LS/ FSC/C-102P	Practical's 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	Practical's 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	Practical's 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	Practical's 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	Practical's 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/	2	(2)

			NSS/ Swachhta/ vocational Training/ Sports/ others		
			Total	24	28
<b>SUMMER Internship: 15 days</b>			<b>Swayam Swachhta / NSS / Industrial Tour/ others</b>	<b>2</b>	<b>100</b>
III	Core-5	LS/FSC/C-305-L	Forensic Dermatoglyphics	4	4
	Core -5 Practical	LS/FSC/C-305-P	Practical's 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	Practical's based on Technological Methods	2	4
	Core - 7	LS/FSC/C-307-L	Criminalistics	4	4
	Core – 7 Practical	LS/FSC/C-307-P	Practical's 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	Practical's 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	Practical's 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	Practical's 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	Practical's 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	Practical's 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
<b>SUMMER Internship: 15 days</b>			<b>Swayam Swachhta / NSS / Industrial/ others</b>	<b>2</b>	<b>100</b>

V	Core-11	LS/FSC/C-511-L	Forensic Ballistics	4	4
	Core -11 Practical	LS/FSC/C-511-P	Practical's 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	Practical's 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	<b>A</b> Digital Forensics <b>B</b> Economic Offences	4	4
	DSE-1 - Practical	LS/FSC/DSE-501(A)-P LS/FSC/DSE-501-(B)-P	<b>A</b> Practical's based on Digital Forensics <b>B</b> Practical's 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	<b>A</b> Forensic Serology <b>B</b> Accident Investigations	4	4
	DSE-2 - Practical	LS/FSC/DSE-502-(A)-P LS/FSC/DSE-502-(B)-P	<b>A</b> Practical's based on Forensic Serology <b>B</b> Practical's 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	Practical's 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	Practical's 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	<b>A</b> DNA Typing <b>B</b> Modern Forensic Toxicology	4	4
	DSE-3 - Practical	LS/FSC/DSE-603-(A)-P LS/FSC/DSE-603-(B)-P	<b>A</b> Practical's based on DNA Typing <b>B</b> Practical's based on Modern Forensic Toxicology	2	4
	Discipline Specific Elective (DSE-4) + DSE-4 – Practical <b>Or</b> Dissertation/ Project work	LS/FSC/D/PW/604	Dissertation/Project work	4+2=6 <b>Or</b> 5 +1=6	8

	followed by seminar				
			TOTAL	24	32
			<b>TOTAL CREDITS</b>	<b>152 + 4 (SI)</b>	

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 III<sup>rd</sup> and IV<sup>th</sup> semester, so that all the student can have exposure of one additional subject. **(Subject to approval by the competent authority)**

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

<b>Sl. No.</b>	<b>Generic Elective Papers (Theory)</b>	<b>Generic Elective Papers (Practical)</b>
1	Elementary Forensic Science	Practical's based on Crime Scene Investigation
2	Applied Forensic Science	Practical's based on Applied Forensic Science
3	Crime Scene Management	Practical's based on Crime Scene Management
4	Advanced Forensic Science	Practical's based on Advanced Forensic Science

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

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

**Three year UG Course in Forensic Science**  
**Semester – I**                      **LS/FSC/C-101 L**

**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**

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



**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 Investigative strategy and Role of media 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, 8<sup>th</sup> Edition, Prentice Hall, New Jersey (2004).



**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 IPC pertaining 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 of Narcotic, Drugs and Psychotropic Substances (NDPS) Act, Essential Commodity Act, Drugs and Cosmetics Act, Explosive Substances Act, Arms Act. Dowry Prohibition Act, Prevention of Food Adulteration Act, Prevention of Corruption Act, Wildlife Protection Act. I.T. Act 2000, Environment Protection Act, Untouchability Offences Act

**Suggested Readings**

1. 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, Ram Criminology, Rawat Publication, 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**

**Practical's 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**  
**Practical's 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 and M. Stoilovic, Fingerprints and other Ridge Skin Impressions, CRC Press, Boca Raton (2004).
4. Lee and Gaenslen'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**  
**Practical's 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**



**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, 6<sup>th</sup> 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**  
**Practical's 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**  
**Practical's 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  
Practical's 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).



**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 bullets Ricochet 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, Head stamp 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



**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**



**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**  
**Practical's based on Forensic Anthropology**

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

**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 versus 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**







**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. Saferstein, 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**  
**Practical's 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 .



**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, Somatometry, Osteometry and Craniometry 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) Clifton D. Pryart, Editor in chief routeledge, 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.







**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**

Relevant 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. Practical's 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 TALLY 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.



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



**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. Mendelian 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.





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 LT Fairhall,-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. Practical's 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.