



List of New Course(s) Introduced

Department : **Forensic Science**

Programme Name : **B.Sc. & M.Sc**

Academic Year : **2018-19**

List of New Course(s) Introduced

Sr.	Course Code	Name of the Course
01.	LS/FSC/C-101L	Introduction to Forensic Science
02.	LS/ FSC/C-101P	Practicals based on Crime Scene
03.	LS/ FSC/C-102L	Crime and Society
04.	LS/ FSC/C-102P	Practicals based on Crime and Society
05.	LS/ FSC/GE-101/L	Elementary Forensic Science
06.	LS/ FSC/GE-101/P	Practicals based on Crime Scene Investigation
07.	LS/ FSC/AECC-101/EC	English Communication / MIL (Hindi Communication)
08.	LS/FSC/ECA/	ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others
09.	LS/FSC/C-203-L	Criminal Law
10.	LS/FSC/C-203-P	Practicals based on preparing schedules
11.	LS/FSC/C-204-L	Forensic Psychology
12.	LS/FSC/C-204-P	Practicals based on Forensic Psychology
13.	LS/FSC/GE-202-L	Applied Forensic Science
14.	LS/FSC/GE-202-P	Practicals based on Applied Forensic Science
15.	LS/FSC/AE-201/ES	Environmental Science
16.	LS/FSC/ECA/	ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others
17.	LS/FSC/C-305-L	Forensic Dermatoglyphics
18.	LS/FSC/C-305-P	Practicals based on Finger Prints
19.	LS/FSC/C-306-L	Technological Methods in Forensic Science
20.	LS/FSC/C-306-P	Practicals based on Technological Methods
21.	LS/FSC/C-307-L	Criminalistics
22.	LS/FSC/C-307-P	Practicals based on Crime scene samples
23.	LS/FSC/GE-303-L	Crime Scene Management
24.	LS/FSC/GE-303-P	Practicals based on Crime Scene Management
25.	LS/FSC/SEC-301-L	Introduction to Biometry


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26	LS/FSC/C-408-L	Forensic Chemistry
28	LS/FSC/C-408-P	Practicals based on Forensic Chemistry
29	LS/FSC/C-409-L	Questioned Documents
30	LS/FSC/C-409-P	Practicals based on Questioned Documents
31	LS/FSC/C-410-L	Forensic Biology
32	LS/FSC/C-410-P	Practicals based on Forensic Biology
33	LS/FSC/GE-404-L	Advanced Forensic Science
34	LS/FSC/GE-404-P	Practicals based on Advanced Forensic Science
35	LS/FSC/SEC-402-L	Handwriting Identification and Recognition
36		Swayam Swachhta / NSS / Industrial/ others
37	LS/FSC/C-511-L	Forensic Ballistics
38	LS/FSC/C-511-P	Practicals based on Forensic Ballistics
39	LS/FSC/C-512-L	Forensic Toxicology
40	LS/FSC/C-512-P	Practicals based on Forensic Toxicological analysis
41	LS/FSC/DSE-501(A)-L	A Digital Forensics
	LS/FSC/DSE-501-(B)-L	B Economic Offences
42	LS/FSC/DSE-501(A)-P	A Practicals based on Digital Forensics
	LS/FSC/DSE-501-(B)-P	B Practicals based on Economic offences
43	LS/FSC/DSE-502-(A)-L	A Forensic Serology
	LS/FSC/DSE-502-(B)-L	B Accident Investigations
44	LS/FSC/DSE-502-(A)-P	A Practicalsbased on Forensic Serology
	LS/FSC/DSE-502-(B)-P	B Practicals based on Accident Investigations
45	LS/FSC/C-613-L	Forensic Anthropology
46	LS/FSC/C-613-P	Practicals based on Forensic Anthropology



47	LS/FSC/C-614-L	Forensic Medicine
48	LS/FSC/C-614-P	Practicals based on Forensic Medicine
49	LS/FSC/DSE-603-(A)-L	A DNA Typing
	LS/FSC/DSE-603-(B)-L	B Modern Forensic Toxicology
50	LS/FSC/DSE-603-(A)-P	A Practical based on DNA Typing
	LS/FSC/DSE-603-(B)-P	B Practical based on Modern Forensic Toxicology
51	LS/FSC/D/PW/604	Dissertation/Project work
	IFSC701	Forensic science & Criminology
	IFSC702	Forensic techniques & Instrumentation
	IFSC703	Crime Scene Management
	IFSC704	Questioned Documents
	IFSL705	Practical based on crime scene search study
	IFSL 706	Practical based on questioned document
	IFSS 707	Seminar
	IFSC801	Instrumental analysis-Chemical & Physical
	IFSC802	Instrumental Analysis – Biological Methods
	IFSC803	Forensic Anthropology and Fingerprints
		Forensic Chemistry and Toxicology





IFSC804	
IFSL 805	Practical based on Forensic Anthropology and Finger prints
IFSL 806	Practical based on Chemistry and toxicological analysis
IFSS 807	Seminar
IFSC901	Computer Forensics and Digital investigations
IFSC902	Forensic Ballistics and Physics
IFSC903	Forensic Biology and Serology
IFSC904	Forensic Medicine
IFSL905	Practical Based on Forensic Ballistics and Physics
IFSL906	Practical Based on Forensic Biology and Serology
IFSC907	Seminar
IFSC 1001	Quality Management & Research Methodology
IFSC 1002	Elective Papers
IFSC 1002 (A)	Advanced Forensic Chemistry
IFSC 1002 (B)	Advanced Forensic Toxicology and Pharmacology
IFSC 1002 (C)	Drugs of Abuse
IFSC 1002 (D)	Advanced Forensic Physics
IFSC 1002 (E)	Advanced Forensic Ballistics
IFSC 1002 (F)	Questioned Documents
IFSC 1002 (G)	Forensic Photography
IFSC 1002 (H)	Biometrics (Through portrait Parle



		Technique)
	IFSC 1002 (I)	Advanced Forensic Biology
	IFSC 1002 (J)	Advanced Forensic Serology & Immunology
	IFSC 1002 (K)	Advanced Forensic Genetics & DNA Profiling
	IFSL 1003	Elective Practical's
	IFSL 1003 (A)	Practical based on Advanced Forensic Chemistry
	IFSL 1003 (B)	Practical based on Advanced Forensic Toxicology and Pharmacology
	IFSL 1003 (C)	Practical based on Drugs of Abuse
	IFSL 1003 (D)	Practical based on Advanced Forensic Physics
	IFSL 1003 (E)	Practical based on Advanced Forensic Ballistics
	IFSL 1003 (F)	Practical based on Questioned Documents
	IFSL 1003 (G)	Practical based on Forensic Photography
	IFSL 1003 (H)	Practical based on Biometrics (Through portrait Parle Technique)
	IFSL 1003 (I)	Practical based on Advanced Forensic Biology
	IFSL 1003 (J)	Practical based on Advanced Forensic Serology & Immunology
	IFSL 1003 (K)	Practical based on Advanced Forensic Genetics & DNA Profiling
	IFSD 1004	Dissertation


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BILASPUR (C.G.)



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

Academic Year : 2018-19

School : School of Studies of Interdisciplinary Education & Research

Department : Forensic Science

Date and Time : 28 June 2018 1:00 PM

Venue : Department of Forensic Science

The scheduled meeting of member of Board of Studies (BoS) of Department of Forensic Science, School of Studies of Interdisciplinary Education & Research, Guru Ghasidas Vishwavidyalaya, Bilaspur was held to design and discuss the syllabus of 3 year UG Program as per CBCS scheme and syllabi.

The following members were present in the meeting:

1. Prof. Mitashree Mitra (External Expert Member BoS, Dept. of Forensic Science , Pt. Ravi Shankar Shula University Raipur)
2. Dr. Renu Bhatt (Member BoS, Dept. of Forensic Science.)
3. Dr. Bharti Ahirwar (HOD, Dept. of Forensic Science .-cum Chairman, BOS)


Following points were discussed during the meeting

- ❖ The syllabus of three-year UG program in Forensic Science (B.Sc. Hons.) was discussed in detail. The scheme and syllabus were approved as per guidelines of UGC (<http://www.ugc.ac.in/pdfnews8218435-B.Sc-Hons.-Forensic Science.pdf>)
- ❖ The CBCS scheme of Forensic Science was approved as per the decision of the meeting of all Heads & Course Coordinators of CBCS program chaired by Dean, School of Studies of Life Science held on June 19, 2018. Board of Studies approved the syllabus of CBCS.
- ❖ It was suggested by the expert that the learning outcome also be mentioned in the syllabus of next meeting.

The committee discussed and approved the scheme and syllabi of UG and PG course as per CBCS.

The following new courses were introduced in the Three year UG course in Forensic Science

- ❖ LS/FSC/C-101L Introduction to Forensic Science
- ❖ LS/ FSC/C-101P Practicals based on Crime Scene
- ❖ LS/ FSC/C-102L Crime and Society


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- ❖ LS/ FSC/C-102P Practicals based on Crime and Society
- ❖ LS/ FSC/GE-101/L Elementary Forensic Science
- ❖ LS/ FSC/GE-101/P Practicals based on Crime Scene Investigation
- ❖ LS/ FSC/AECC-101/EC English Communication / MIL (Hindi Communication)
- ❖ LS/FSC/ECA/ ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others
- ❖ LS/FSC/C-203-L Criminal Law
- ❖ LS/FSC/C-203-P Practicals based on preparing schedules
- ❖ LS/FSC/C-204-L Forensic Psychology
- ❖ LS/FSC/C-204-P Practicals based on Forensic Psychology
- ❖ LS/FSC/GE-202-L Applied Forensic Science
- ❖ LS/FSC/GE-202-P Practicals based on Applied Forensic Science
- ❖ LS/FSC/AE-201/ES Environmental Science
- ❖ LS/FSC/ECA/ ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others
- ❖ LS/FSC/C-305-L Forensic Dermatoglyphics
- ❖ LS/FSC/C-305-P Practicals based on Finger Prints
- ❖ LS/FSC/C-306-L Technological Methods in Forensic Science
- ❖ LS/FSC/C-306-P Practicals based on Technological Methods
- ❖ LS/FSC/C-307-L Criminalistics
- ❖ LS/FSC/C-307-P Practicals based on Crime scene samples
- ❖ LS/FSC/GE-303-L Crime Scene Management
- ❖ LS/FSC/GE-303-P Practicals based on Crime Scene Management
- ❖ LS/FSC/SEC-301-L Introduction to Biometry
- ❖ LS/FSC/C-408-L Forensic Chemistry
- ❖ LS/FSC/C-408-P Practicals based on Forensic Chemistry
- ❖ LS/FSC/C-409-L Questioned Documents
- ❖ LS/FSC/C-409-P Practicals based on Questioned Documents
- ❖ LS/FSC/C-410-L Forensic Biology
- ❖ LS/FSC/C-410-P Practicals based on Forensic Biology

New Course Introduced

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Criteria - I (1.2.1)



- ❖ LS/FSC/GE-404-L Advanced Forensic Science
- ❖ LS/FSC/GE-404-P Practicals based on Advanced Forensic Science
- ❖ LS/FSC/SEC-402-L Handwriting Identification and Recognition
- ❖ **Swayam Swachhta / NSS / Industrial/ others**
- ❖ LS/FSC/C-511-L Forensic Ballistics
- ❖ LS/FSC/C-511-P Practicals based on Forensic Ballistics
- ❖ LS/FSC/C-512-L Forensic Toxicology
- ❖ LS/FSC/C-512-P Practicals based on Forensic Toxicological analysis
- ❖ LS/FSC/DSE-501(A)-L **A** Digital Forensics
- ❖ LS/FSC/DSE-501-(B)-L **B** Economic Offences
- ❖ LS/FSC/DSE-501(A)-P **A** Practicals based on Digital Forensics
- ❖ LS/FSC/DSE-501-(B)-P **B** Practicals based on Economic offences
- ❖ LS/FSC/DSE-502-(A)-L **A** Forensic Serology
- ❖ LS/FSC/DSE-502-(B)-L **B** Accident Investigations
- ❖ LS/FSC/DSE-502-(A)-P **A** Practicals based on Forensic Serology
- ❖ LS/FSC/DSE-502-(B)-P **B** Practicals based on Accident Investigations
- ❖ LS/FSC/C-613-L Forensic Anthropology
- ❖ LS/FSC/C-613-P Practicals based on Forensic Anthropology
- ❖ LS/FSC/C-614-L Forensic Medicine
- ❖ LS/FSC/C-614-P Practicals based on Forensic Medicine
- ❖ LS/FSC/DSE-603-(A)-L **A** DNA Typing
- ❖ LS/FSC/DSE-603-(B)-L **B** Modern Forensic Toxicology
- ❖ LS/FSC/DSE-603-(A)-P **A** Practicals based on DNA Typing
- ❖ LS/FSC/DSE-603-(B)-P **B** Practicals based on Modern Forensic Toxicology
- ❖ LS/FSC/D/PW/604 Dissertation/Project work

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IFSC701 Forensic science & Criminology

IFSC702 Forensic techniques & Instrumentation

IFSC703 Crime Scene Management

IFSC704 Questioned Documents

IFSL705 Practical based on crime scene search study

IFSL 706 Practical based on questioned document

IFSS 707 Seminar

IFSC801 Instrumental Analysis-Chemical & Physical

IFSC802 Instrumental Analysis – Biological Methods

IFSC803 Forensic Anthropology and Fingerprints

IFSL 805 Practical based on Forensic Anthropology and Finger prints

IFSL 806 Practical based on Chemistry and toxicological analysis

IFSS 807 Seminar

IFSC901 Computer Forensics and Digital investigations

IFSC902 Forensic Ballistics and Physics IFSC903 Forensic Biology and Serology

IFSC904 Forensic Medicine

IFSL905 Practical Based on Forensic Ballistics and Physics

IFSL906 Practical Based on Forensic Biology and Serology

IFSC907 Seminar

IFSC 1001 Quality Management & Research Methodology

IFSC 1002 Elective Papers

IFSC 1002 (A) Advanced Forensic Chemistry

IFSC 1002 (B) Advanced Forensic Toxicology and Pharmacology

IFSC 1002 (C) Drugs of Abuse IFSC 1002 (D) Advanced Forensic Physics

IFSC 1002 (E) Advanced Forensic Ballistics

IFSC 1002 (F) Questioned Documents

IFSC 1002 (G) Forensic Photography

IFSC 1002 (H) Biometrics (Through portrait Parle Technique)

IFSC 1002 (I) Advanced Forensic Biology

IFSC 1002 (J) Advanced Forensic Serology & Immunology

IFSC 1002 (K) Advanced Forensic Genetics & DNA Profiling

IFSL 1003 Elective Practical's

IFSL 1003 (A) Practical based on Advanced Forensic Chemistry

IFSL 1003 (B) Practical based on Advanced Forensic Toxicology and Pharmacology

IFSL 1003 (C) Practical based on Drugs of Abuse

IFSL 1003 (D) Practical based on Advanced Forensic Physics

IFSL 1003 (E) Practical based on Advanced Forensic Ballistics

IFSL 1003 (F) Practical based on Questioned Documents

IFSL 1003 (G) Practical based on Forensic Photography

IFSL 1003 (H) Practical based on Biometrics (Through portrait Parle Technique)

IFSL 1003 (I) Practical based on Advanced Forensic Biology

IFSL 1003 (J) Practical based on Advanced Forensic Serology & Immunology

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गुरु घासीदास विश्वविद्यालय
(केन्द्रीय विश्वविद्यालय अधिनियम 2009 क्र. 25 के अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)
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IFSL 1003 (K) Practical based on Advanced Forensic Genetics & DNA Profiling
IFSD 1004 Dissertation

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Signature & Seal of HoD



Scheme and Syllabus

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- 1)	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)



			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



	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	A Digital Forensics B Economic Offences	4	4
	DSE-1 - Practical	LS/FSC/DSE-501(A)-P LS/FSC/DSE-501-(B)-P	A Practicals based on Digital Forensics B Practical 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	A Forensic Serology B Accident Investigations	4	4
	DSE-2 - Practical	LS/FSC/DSE-502-(A)-P LS/FSC/DSE-502-(B)-P	A Practicals based on Forensic Serology B Practical 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 Modern Forensic Toxicology	4	4
	DSE-3 - Practical	LS/FSC/DSE-603-(A)-P LS/FSC/DSE-603-(B)-P	A Practicals based on DNA Typing B Practical 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



	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.



Semester – VII					
Semester	Paper Code	Paper	Title of the Paper	Hours/Week	Credits
Seventh Semester	IFSC701	I	Forensic science & Criminology	4	3
	IFSC702	II	Forensic techniques& Instrumentation	4	3
	IFSC703	III	Crime Scene Management	4	3
	IFSC704	IV	Questioned Documents	4	3
	IFSL705	V	Practical based on crime scene search study	6	3
	IFSL 706	VI	Practical based on questioned document	6	3
	IFSS 707	VII	Seminar	2	2
Credits					20
Semester – VIII					
Eighth Semester	IFSC801	I	Instrumental analysis-Chemical & Physical	4	3
	IFSC802	II	Instrumental Analysis – Biological Methods	4	3
	IFSC803	III	Forensic Anthropology and Finger prints	4	3
	IFSC804	IV	Forensic Chemistry and Toxicology	4	3
	IFSL 805	V	Practical based on Forensic Anthropology and Finger prints	6	3
	IFSL 806	VI	Practical based on Chemistry and toxicological analysis	6	3
	IFSS 807	VII	Seminar	2	2
Credits					20
Semester IX					
Ninth Semester	IFSC901	I	Computer Forensics and Digital investigations	4	3
	IFSC902	II	Forensic Ballistics and Physics	4	3
	IFSC903	III	Forensic Biology and Serology	4	3
	IFSC904	IV	Forensic Medicine	4	3
	IFSL905	V	Practical Based on Forensic Ballistics and Physics	6	3
	IFSL906	VI	Practical Based on Forensic Biology and Serology	6	3
	IFSC907	VII	Seminar	2	2
Credits					20



Department of Forensic Science, GG^V/Bilaspur

	IFSC 1001	I	Quality Management & Research Methodology	4	3
	IFSC 1002		Elective Papers	4	3
	IFSC 1002 (A)	II	Advanced Forensic Chemistry		
	IFSC 1002 (B)		Advanced Forensic Toxicology and Pharmacology		
	IFSC 1002 (C)		Drugs of Abuse		
	IFSC 1002 (D)		Advanced Forensic Physics		
	IFSC 1002 (E)		Advanced Forensic Ballistics		
	IFSC 1002 (F)		Questioned Documents		
	IFSC 1002 (G)		Forensic Photography		
	IFSC 1002 (H)		Biometrics (Through portrait Parle Technique)		
	IFSC 1002 (I)		Advanced Forensic Biology		
	IFSC 1002 (J)		Advanced Forensic Serology & Immunology		
	IFSC 1002 (K)		Advanced Forensic Genetics & DNA Profiling		
	IFSL 1003		Elective Practical's	6	4
	IFSL 1003 (A)	III	Practical based on Advanced Forensic Chemistry		
	IFSL 1003 (B)		Practical based on Advanced Forensic Toxicology and Pharmacology		
	IFSL 1003 (C)		Practical based on Drugs of Abuse		
	IFSL 1003 (D)		Practical based on Advanced Forensic Physics		
	IFSL 1003 (E)		Practical based on Advanced Forensic Ballistics		
	IFSL 1003 (F)		Practical based on Questioned Documents		
	IFSL 1003 (G)		Practical based on Forensic Photography		
	IFSL 1003 (H)		Practical based on Biometrics (Through portrait Parle Technique)		
	IFSL 1003 (I)		Practical based on Advanced Forensic Biology		
	IFSL 1003 (J)		Practical based on Advanced Forensic Serology & Immunology		
	IFSL 1003 (K)		Practical based on Advanced Forensic Genetics & DNA Profiling		
	IFSD 1004		Dissertation		10
			Credits		20
			Total Credits		80



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:

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

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).

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 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*, 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, Ram *Criminology*, Rawat Publication, 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 suggest 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 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

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 and 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 Saferstein, 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. Saferstein, 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 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, 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.Saferstein, 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 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

- 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 Steganography.

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. 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
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, 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 Routledge, 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

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. 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 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.

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. 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.

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.

**Five Year Integrated UG/PG Course in
Forensic Science Semester -VII, IFSC- 701**

Paper – I

Forensic science and Criminology

Maximum Marks: 100

Allotted credits: 03

UNIT I

Forensic Science Definition, Scope, History and Development, Basic Principles of Forensic Science, Organizational structure of Forensic Science Laboratories at State and Central level , FPB, NICFS, CDTS (Central Detective Training School), NCRB, Ethics in Forensic Science, Duties of Forensic Scientist, Laboratory management system and Importance of accreditation in forensic science laboratories.

UNIT II

Law- General idea to IPC, IEA, CrPC, and its relevant sections related to Forensic Science.
Introduction to offences against person.

UNIT III

Criminology: Definition & scope, crime & Criminal, Introduction to classification of Offences. Brief introduction to schools of Criminology; White Collor crime, Organized Crimes, Economic crimes, Cyber crimes, crime against children and Woman.

UNIT IV

Police Science: Police Organizations at State and Central Level, Introduction to CBI, BPR&D. Interpole its Role and functions. Introduction to Punishment, theories and types.

Recommended Book

1. Sharma, B.R.: Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad, 1974.
2. Lundquest & Curry: Forensic Science, Vol I to IV, 1963, Charls C. Thomas, Illinosis, USA.
3. Saferstein: Forensic Science Handbook, Vol I, II & III, Prentice Hall Inc. USA.
4. Saferstein: Criminalistics, 1976, Prentice Hall Inc. USA.
5. Kirk: Criminal Investigation, 1953, Interscience Publisher Inc. New York.
6. Lee & Gaensselen: Advances in Forensic Science (Vol.2) Instrumental Analysis.
7. Kleiner, Munay (2002): Handbook of Polygraph testing. Academic Press.
8. Hess, A.K. and Weiner, I.B. (1999) Handbook of Forensic Psychology 2nd Ed. John wiley & sons.
9. Bruce A. Arrigo (2000) Introduction to Forensic Psychology Academic Press, London
10. N. Gilbert; Criminal Investigation; Third edition, Macmillan Publishing Company, 1993.

**Five Year Integrated UG/PG Course in
Forensic Science Semester –VII, IFSC- 702**

Paper – II

**Forensic Techniques and
Instrumentation**

Maximum Marks: 100

Allotted credits: 03

UNIT I

Ballistic Fingerprinting: Basic concepts of Forensic Profiling, Geographic profiling, Automated Drug-Profiling System, Sound Spectrograph; Breathalyzer, Electrostatic detection device (EDD), Video Superimposition technique, Forensic Palynology, Basic principles and techniques of Forensic photography.

UNIT II

Infrared Microscope, Forensic Microscopy, Scanning Electron Microscope (SEM), Differential Scanning Calorimeter (DSC), Differential Thermal Analyzer (DTA), Neutron Activation Analysis (NAA) Nuclear Magnetic Resonance spectroscopy, DNA Sequence Analyzer.

UNIT III

DNA fingerprinting: Introduction of DNA, Nature, Sources of DNA, Extraction of DNA, Basics of DNA Profiling: Polymerase Chain reaction. (PCR), Restriction fragment length polymorphism (RFLP,) Short tandem repeat (STR), Forensic significance of DNA fingerprinting.

UNIT IV

Introduction to forensic Psychology: Basic concepts of Forensic Psycholinguistic Profiling, Psychological profiling, Legal tests for insanity. Narco analysis, Brain mapping, Polygraph: Principle, technique, forensic significance

Recommended Books

1. Robert D. Keppel Katherine M. Brown and Kristen Welch Forensic Pattern Recognition, Prentice Hall
2. Richard Saferstein, Criminalistics: An Introduction to Forensic Science. Prentice Hall
3. Thali, Michael J., Brogdon's Forensic Radiology ,CRC Press
4. Sanford L. Weiss, Forensic Photography: The Importance of Accuracy, Prentice Hall
5. Christopher D D ,Advanced Crime Scene Photography CRC
6. Brent E. Turvey ,Criminal Profiling, Fourth Edition: An Introduction to Behavioral Evidence Analysis
7. Murray Kleiner Handbook of Polygraph Testing. Academic Press.
8. Qazalbash Yawer Law of Lie Detectors – Narco Analysis, Polygraph analysis, Brainmapping, Brain Fingerprinting Universal Law Publishing Co. Pvt. Ltd
9. Sharma, B.R. Scientific Criminal investigation, Universal Law Publishing Co.
10. Eckert W.G. Introduction to Forensic Sciences , CRC, New York
11. Siegel, J. A., Saukko, P. J. And Knupfer, G.C., Encyclopedia of Forensic Sciences ,Academic Publishers, London
12. Frederick P. Smith, Sotiris A. Athanaselis Handbook of forensic drug analysis Academic Press

**Five Year Integrated UG/PG Course in
Forensic Science Semester –VII, IFSC-703**

Paper – III

Crime Scene Management

Maximum Marks: 100

Allotted credits: 03

Unit I

Introduction to Crime scene investigation, Definition and Types of Crime scene, Principles of Forensic science, Experts team Composition, Role of First responding officer, Physical Evidences. Introduction, Definition, Types and their collection, Preservation, packaging, transporting and forwarding, various techniques used for handling, Physical and trace evidences, Crime scene tool kits and equipments etc. Ethics in Crime Scene Investigation.

Unit II

Digital evidence: Introduction, Definition types and their collection, preservation, packaging, transporting, storage and forwarding, Methodological approach to processing the crime scene. Processing a crime scene, Searching the scene- Types of Searches, Zone Search: Ever Widening, Circle Strip Search, and Grid Search, Indoor searches and outdoor searches.

Unit III

Crime Scene Documentation, Crime Scene Photography, Videography, sketching and mapping. chain of custody, interpreting a crime scene, Reconstruction of a crime scene.

Unit IV

Crime scene management or crime scene investigation in the cases of fire and Arson, Explosions, Burglary and Theft, Hit & run, Sexual offences, Death investigation. Use of Forensic light sources for detection of biological evidences at scene of crime scene, Presumptive test for identifying narcotic drugs, blood, semen, explosive and Gunshot residues etc. Computer graphics, Electronic Detectors ND Magnetic locators.

Recommended Books

1. Saferestein, Criminalistics: An Introduction to Forensic Science Prentice Hall INC, USA
2. James S.H. and Nordby, J.J. : Forensic Science- An introduction to scientific and Investigative Techniques, CRC Press USA.
3. Eckert W.G. Introduction to Forensic Sciences , CRC, New York
4. Siegel, J. A., Saukko, P. J. And Knupfer, G.C., Encyclopedia of Forensic Sciences, Academic Publishers, London
5. Kirk ,P.L .Fire Investigations, John Wiley and Sons
6. Kirk, P.L.; Criminal Investigation, Inter science Publisher Inc New York.
7. Anita .Y. Wonder ; Bloodstain Pattern Elsevier, London
8. Barry, A.J. Fisher.; Techniques of Crime Scene Investigation, 6th Edition Ed, C.R.C Press NY(2003)
9. Mordby, J Deed Reckoning ; The Art of Forensic Detection, CRC Pre LLC(2000)
10. Eckett, W.G & James S.H; Interpretation of Bloodstains, Evidence of Crime Scene, Elsevier Pub. NY (1989)

Five Year Integrated UG/PG Course in
Forensic Science Semester –VII,
IFSC- 704

Paper – IV
Questioned Documents

Maximum Marks: 100

Allotted credits: 03

UNIT I

Nature and problems of Document examination, Classification of documents, Types of Forensic Documents; Collection, handling, preservation, marking and forwarding of documents to the laboratory; Writing instruments and their characteristics.

UNIT II

Principle of handwriting identification, Hand writing and its characteristics, Individual characteristics, Factors affecting hand writing, Samples for comparison and comparison of handwriting, Examination of Signature characteristics, Disguised, Indented and secrete writings, Anonymours letters.

UNIT III

Alterations in Documents, Examination of Paper & Ink, Examination of typed documents, Examination of Seal, rubber & other mechanical impressions, Handling and examination of charred documents, Examination of Forged currency notes.

UNIT IV

Forgery, Methods of Forgery, Age determination of documents, Basic tools needed for Forensic document examination, Photography of documents, Principle and Forensic significance of Video Spectral comparator (VSC), Electrostatic detection apparatus (ESDA).

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, Universal Law Pub. Delhi Indian
4. Hard less H.R; Disputed Documents, Handwriting and Thumbs – Print identification, profusely illustrated, Law Book, Allahabad
5. Morris Ron N. Forensic Handwriting Identification; AcadPress, London.
6. Roy A Huber, A.M. Headrick; Handwriting Identification- Facts and Fundamental, CRC Press
7. Laboratory working procedure manual, Documents DFS, New Delhi, 2005

**Five Year Integrated UG/PG Course in
Forensic Science Semester –VII, IFSL- 705**

Paper – V

**Practical Based on Crime Scene Search
Study**

Maximum Marks: 100

Allotted credits: 03

1. Evaluation of Crime scene and photographs
2. Searching of physical evidence at crime scene.
3. Collection of evidence with individual characteristics:
(1) Fingerprints (2) Tire tracks and foot impressions
4. Analysis of pattern –Blood stain pattern, Fire pattern
5. Lifting or prints and impressions by caste and replicas.
6. Sole prints comparison and their lifting from the scene of crime.
7. Collection, packing and preservation of biological evidences
8. Reconstruction of crime scene
9. Preparation of report of the examination.

Five Year Integrated UG/PG Course in
Forensic Science Semester –VII, IFSL-706

Paper – VI

Practical Based on Questioned
Documents

Maximum Marks: 100

Allotted credits: 03

1. Examination of Erasures on Questioned document.
2. Examination of Obliteration on Questioned document.
3. Examination of Addition on Questioned document.
4. Decipher unknown Secret Writings.
5. Chromatographic comparison of different ink.
6. Comparison of Handwriting and Signatures.

**Five Year Integrated UG/PG Course in
Forensic Science Semester -VII, IFSL- 707**

Paper – VII

Seminar

Maximum Marks: 50

Allotted credits: 02

Seminar based on any relevant topics taught from the above Four Theory Papers in Current Semester.

**Five Year Integrated UG/PG Course in
Forensic Science Semester –VIII, IFSC- 801**

Paper – I

**Instrumental Analysis- Chemical and
Physical**

Maximum Marks: 100

Allotted credits: 03

UNIT-I

Basic concepts of Atomic spectra, Energy levels and Molecular spectra, Electromagnetic spectrum, Sources of radiation, Introduction to spectroscopy, Detector and its types.

UNIT-II

UV-Visible spectroscopy: Basic concepts, Principles and Forensic applications of UV-visible spectroscopy, Infra Red (IR) spectroscopy, Fourier transform Infra Red (FTIR) spectrophotometer.

UNIT-III

Chromatography: General introduction to chromatography, Basic concepts, principles and functions of Thin Layer chromatography (TLC), High Performance Liquid Chromatography (HPLC), Gas Chromatography (GC) and High performance Thin layer Chromatography (HPTLC).

UNIT-IV

Spectrophotometry: General introduction, Basic concepts, Principles and Forensic application of Atomic Absorption Spectrophotometry (AAS), Atomic emission Spectrometry (AES), Inductive coupled plasma (ICP), X-ray spectroscopy, Auger emission spectroscopy, Mass spectrometry.

Recommended Books:

1. John C. Lindon, George E. Tranter & John L. Holmes; Encyclopedia of Spectroscopy & Spectrometry, Academic Press (2000)
2. Cottrell, C.T. Irish, D, Msters V M., and Steward, J.E. (1985) Introduction to ultraviolet and visible spectrophotometry, 2nd ed. Pye Unicam, Cambridge
3. Burgess, C., and Knowle, A. (1981) Technique in visible and Ultraviolet absorption spectroscopy, Chappman and Hall, London
4. Claridge, T. D. W., High-Resolution NMR Techniques in Organic Chemistry. A Practical Guide to Modern NMR for Chemists, OUP, Oxford, 2000
5. Gunther, H., NMR Spectroscopy. Basic Principles, Concepts and Applications in Chemistry, 2nd Edn, Wiley, Chichester, 1995
6. Chapman, R (1985) Practical Organic Mass Spectrometry, Wiley & Sons, London
7. Davis, R. and Frearson, M. (1987) Mass Spectrometry, Wiley, London
8. McLafferty, F.W. and Turecek, F. (1993) Interpretation of Mass Spectra, 4th edn., University Science Books, Mill Valley, USA.
9. Working Procedure Manual : Physics/Chemistry DFS, Publication (2005)
10. Long, D.A. (1977) Raman spectroscopy, McGraw-Hill, Maidenhead

Five Year Integrated UG/PG Course in
Forensic Science Semester –VIII,
IFSC- 802

Paper – II
Instrumental methods-Biological

Maximum Marks: 100

Allotted credits: 03

UNIT I

Basic principles of Microscopy, Comparison microscope, Stereoscopic microscope, Fluorescent Microscopy, Infra red .Microscopy, Scanning Electron Microscope (SEM) & Transmission Electron Microscope (TEM)

UNIT II

General principles of Immuno chemical technique, Antigen-Antibdy binding, Production of Antibodies, Precipitin reaction, Gel immuno diffusion, Immuno electrophoresis, Complement fixation, Radio Immuno assay, ELISA, Fluorescent immuno assay.

UNIT III

Electrophoretic Technique, General principles, Factors affecting electrophoresis, High voltage electrophoresis, polyacrylamide gel electrophoresis, Isoelectric focusing (IEF), Isoelectrophoresis, Preparative, Horizontal and Vertical Electrophoresis

UNIT IV

Molecular Biology Techniques: Genetic Manipulations, Gene cloning, DNA extraction, Polymerase chain reaction, DNA sequencing, Gene Libraries, Colony Hybridisation, Nick translation, Expression of Genes

Recommended Books

1. Alan Gunn Essential forensic biology Jhon. Wiley
2. Barbara Wheeler Lori J. Wilson, Practical Forensic Microscopy: A Laboratory Manual.
3. Bryan L. William & Keith Wilson; Principles & Techniques of Practical Biochemistry, Edward Arnold Pub. (1975)
4. Keith Wilson & John Walker; Practical Biochemistry- Principles & Techniques, 5th Ed., Cambridge University Press
5. George M. Malacinski; Essentials of Molecular Biology, 4th Ed. Jones and Bartlet Pub. (2003).
6. Gardnes & Snustd; Principles of Genetics 6th Ed., John Wiley& Sons
7. D.M.Weir; Hand Book of Experimental Immunology, 2nd Ed., Blackwell Pub.
8. Ivan M.Roett; Essential Immunology, 6th Ed., Blackwell Pub.
9. .Working Procedure Manual Biology / Serology, DFS Pub New Delhi 2005

**Five Year Integrated UG/PG Course in
Forensic Science Semester –VIII, IFSC- 803**

Paper – III

Forensic Anthropology and Finger prints

Maximum Marks: 100

Allotted credits: 03

UNIT -I

Forensic Anthropology: Definition scope and Problems, Human skeleton, comparative skeletal anatomy of human and non-human. Bones- Identification, Classification and determination of Site, Morphological and Anatomical Characteristics, Determination of Age, Sex, Race and Stature determination from skeletal remains: skull, Pelvis, and other bones.

UNIT -II

Personal identification techniques: Introduction and forensic importance; Significance of somatoscopy, somatometry, osteometry and craniometry in Personal Identification; Portrait Parle/Bertillon system, Facial reconstruction, Super imposition technique.

Forensic Odontology: Development and scope, Its role in mass disaster and anthropology, Types of teeth and their functions. Age determination from teeth: dental anomalies, Forensic significance of Bites marks: Photography, evaluation and legal significance of bite marks.

UNIT -III

Fingerprint: History and development of finger prints, Structure of ridged skin, morphological plan of volar pads and configurational areas. Development of volar pads, ridges, Classification of finger Prints, pattern types, Henry system of classification (Primary to key classification), Searching of finger print evidence and composition of Sweat.

UNIT -IV

Chance Finger Prints: Conventional methods of development of latent finger prints:. Biological methods of development of latent prints on skin; Systematic approach to latent print processing, preserving and lifting of finger prints; Photography of Finger Prints, comparison of finger prints .Automatic Finger Print Identification system (AFIS), Expert evidence.

Recommended Books

1. Steven N. Byers Introduction to Forensic Anthropology. Allyn & Bacon.
2. Karen Ramey Burns ,Forensic Anthropology Training Manual, The (2nd Edition) Prentice Hall
3. Debra Komar Jane Buikstra, Forensic Anthropology: Contemporary Theory and Practice , Oxford University Press, USA
4. M. Anne Katzenberg (Editor), Shelley R. Saunders, Biological Anthropology of the Human Skeleton, Wiley-Liss
5. Tim D. White , Michael T. Black, Pieter A. Folkens ,Human Osteology, Third Edition , Academic Press
6. D. Gentry Steele, Claud A. Bramblett, The Anatomy and Biology of the Human Skeleton ,Texas A&M University Press
7. Forensic Dentistry by Paul G. Stimson, Curtis A. Mertz; CRC Press, LLC, 1999.
8. Craniofacial Identification in forensic Medicine, edited by John. G Clement and David. L. Ranso; Oxiford University, Press; 1998.
9. Forensic Taphonomy, edited by William D. Haglernd, Marculla H. Sorg; CRC Press, LLC, 1997.

10. Modi, J.K. (1988): Medical Jurisprudence & Toxicology, N.M. Tripathi Pvt. Ltd.

Five Year Integrated UG/PG Course in
Forensic Science Semester –VIII, IFSC- 804
Paper – IV

Forensic Chemistry & Toxicology

Maximum Marks: 100

Allotted credits: 03

UNIT I

Forensic chemistry Definition and scope, Introduction to Narcotic drugs, Depressants, stimulants, and Hallucinogens their Active components and method of analysis, Designer Drugs & Anabolic steroids, Analytical methods of analysis of IMFL, Country and Illicit liquor, Denatured spirits and their analysis.

UNIT II

Fire and Arson investigation- Methods of flammable oil residues detection from debris; Detection of adulteration in Petrol and Diesel, edible oils, Examination of chemicals used in trap cases, Analysis of metals in cheating cases, Explosives: Introduction, classification and various methods of analysis of Explosives.

UNIT III

Forensic Toxicology: Definition and scope, Poisons–Definition and Classification. Methods of isolation of poison from Viscera, Collection and Preservation of Viscera and other relevant materials, Analysis of ethyl alcohol and methyl alcohol in biological fluids.

UNIT IV

Extraction methods of poisons from viscera, blood and urine. Isolation and identification of Plant Poisons, opium and its derivatives, Benzodiazepine tranquilizers, Metallic Poison, Insecticides and Pesticides. Basic concepts of Poisonous Mushrooms, Poisonous fungi, Food Poisoning, Common vegetable abortifacients, Animal poison, Snake venom.

Recommended Books:

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. Kennedy, Thomas J., Christian, Jr., Donnell Basic Principles of Forensic Chemistry, Springer
3. Saferestein, Criminalistics: An Introduction to Forensic Science. Prentice Hall
4. Maudham.B.et.al; Vogel's Textbook of Quantitative Chemical. Analysis, Longman
5. John D. DeHaan ; Kirk's Fire Investigation, Prentice Hall Eaglewood Cliffs, N.J
6. Yinon J; Modern Methods & Application in Analysis of Explosives, John Wiley.
7. C.A. Watson; Official and standardized Methods of Analysis. Royal Society of Chemistry, UK.
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. 14. 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.

**Five Year Integrated M.Sc. Forensic
Science Semester –VIII, IFSL- 805**
Paper – V

**Practical based on Anthropology and
Finger Prints**

Maximum Marks: 100

Allotted credits: 03

1. Determination of sex from Skull Sutures & Pelvis
2. Determination of age from teeth & Skull
3. To perform osteometric measurements on long bones
4. To perform craniometric measurements on skull
5. To perform somatometric measurements on livings- Height vertex, Head length, Head breadth, Foot length, Foot breadth, Nasal height. Nasal breadth, External bi-orbital breadth, Internal bi-orbita breadth, Bigonial breadth and Bizygomatic breadth
6. To obtain Plain and rolled inked finger prints.
7. To identify the finger Print Patterns.
8. To perform ridge tracing and ridge counting.
9. To identify the ridge characteristics.
10. To develop latent finger Prints with powder methods.
11. To develop latent finger Prints with chemical methods.

**Five Year Integrated UG/PG Course in
Forensic Science Semester –VIII, IFSL- 806**

Paper – VI

**Practical –Forensic Chemistry and
Toxicological analysis**

Maximum Marks: 100

Allotted credits: 03

1. Determination of methanol and ethanol in liquor sample.
2. Analysis of narcotic drugs by TLC
3. Determination of Ethanol and Methanol in alcoholic liquors
4. Examination of inorganic acid in partially burnt clothe
5. Detection of adulterant in vegetable oil
6. Identification of opium/ dhatura alkaloids by TLC
7. Identification of poisonous seeds- Ricinus, Croton and Argemone.
8. Analysis of viscera(simulated sample) for Organo Chloro and Organo Phosphorous pesticides

**Five Year Integrated UG/PG Course in
Forensic Science Semester -VIII, IFSL- 807**

Paper – VII

Seminar

Maximum Marks: 50

Allotted credits: 02

Seminar based on any relevant topics taught from the above Four Theory Papers in Current Semester.

**Five Year Integrated M.Sc. Forensic
Science Semester – IX, IFSC- 901**

Paper – I

**Computer Forensics and Digital
Investigations**

Maximum Marks: 100

Allotted credits: 03

UNIT -I

Basics of Computer: Introduction to computer, Operating System Windows/Unix: Operating system and operating environments DOS, Window 95 and 98, Windows NT, Windows 2000, Windows XP, Windows Vista, Windows 7 and Unix. Limitations of operating system, Networking, LAN, WAN, Internet and their forensic significance.

UNIT- II

Computer Crimes: Introduction; Classification; Difference between cyber and conventional crimes; Types of cyber crimes – Cyber stalking; Cyber pornography; forgery and fraud; Cyber terrorism; Spamming, Phishing, Privacy and National Security in Cyberspace, Cyber Defamation and hate speech, computer vandalism economic crimes, Internet or other telecommunication. Hacking, computer viruses and investigative techniques.

UNIT- III

Forensics Tools: Open Source versus Closed Source. Portable Devices & Mobile Phone Forensics, functioning of mobile phone and their operating. Search, Seizure, packaging and transporting of the digital evidence from the scene of crime. Use of Forensic Tool, FTK, Access data Forensic Tool Kit and preparation of the search of computer evidence to preparing courtroom testimony based upon the examination. Password Recovery Tools.

UNIT - IV

Advance practice in Digital Investigation, electronic format and representation in the court as per the Law suit. Fundamentals of current, domain administration; file system management; networked printers; user management; and workstation configuration. Linux Systems, key components of the Linux/UNIX operating system. History of its evolution, selection criteria for Linux/UNIX as an alternative (or cooperative) operating environment in the business world.

Recommended Books:

1. Relevant sections of Information technology Act 2000.
2. Esharenana, Adoni, Frame works for ICT Policy Government, Social and Legal Issues. Information Science Reference, Harsey, New YORK.
3. Robert C. Newman, Computer Forensics: Evidence Collection and Management Auerbach Publications.
4. Eoghan Casey , Handbook of Computer Crime Investigation: Forensic Tools and Technology ,Academic Press
5. Clark, Franklin, and Diliberto, Ken, (1996). Investigating computer Crime, CRC Press, Boca Raton, Florida, USA
6. Tewari, R.K., Sastry, P.K. and Ravikumar, K.V. (2003): Computer Crime & ComputerForensics, Select Publisher, New Delhi.
7. Lang, David L., (2002). Introduction to Computer forensics, CRC Press LLC, Boca Raton, Florida, USA
8. Middleton, Bruce (2001). Cyber Crime Investigator's Field Guide, CRC Press
9. Vacca John R; Computer Forensics, Computer Crime Scene Investigation, Firewall Medial,

An imprint of Laxmi Pub.(2002)

**Five Year Integrated UG/PG Course in
Forensic Science Semester – IX, IFSC- 902**

Paper – II

Forensic Ballistics and Physics

Maximum Marks: 100

Allotted credits: 03

UNIT- I

Ballistics: Introduction, History and Scope, Internal, External and Terminal Ballistics, Firearms, Definition and Classification, Characteristics and firing mechanism of smooth bored and Rifled firearms (Pistol, Revolver, and Rifles, etc), Classification, nomenclature and construction of country made firearms.

UNIT -II

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

UNIT- III

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

UNIT- IV

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

Recommended Books

1. Working Procedure Manual Ballistics/Physics, DFS, New Delhi, 2005
2. Hatcher Jury & Weller, 1987: Firearm Investigation Identification and Evidence, the University Book Agency, Allahabad.
3. Gunther & Gunther, 1935: The Identification of Firearms, Willies, New York.
4. Jauhri, M. 1980: Monograph on Forensic Ballistics, Govt. of India Publication, New Delhi.
5. Burrad, 1951: The Identification of Firearms and Forensic Ballistics.
6. Sharma, B.R.: Firearms in Criminal Investigation and Trails, 1990.
7. Dimado: Gunshot Wounds, 1987.
8. Kumar K: Forensic Ballistics in Criminal Justice, 1987
9. Raymond C Murray & John C.F Tedrew; Forensic Geology, Prentice Hall NJ.
10. B. Caddy; Forensic Examination of Glass and Paints Analysis and Interpretation ISBN 0784 05749 (2001)
11. Safferstein, R, Handbook of Forensic Science, Vol. I, II, (Ed.) Prentice Hall, Eaglewood Cliffs, NJ.
12. Siegel, J. A., Saukko, P. J. And Knupfer, G.C., Encyclopedia of Forensic Sciences, Academic Publishers, London.
13. Philip Rose; Forensic Speaker Identification, Taylor and Francis, Forensic Science Series, London (2002).
14. Eckert W.G. Introduction to Forensic Sciences, CRC, New York.

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

Five Year Integrated UG/PG Course in
Forensic Science Semester – IX, IFSC- 903
Paper – III

Forensic Biology and Serology

Maximum Marks: 100

Allotted credits: 03

UNIT- I

Definition and scope of Forensic biology and serology, Collection and evaluation of biological evidences, Forensic significance of blood, semen Hair, Fibers and plant materials as evidence, Introduction and Scope of Microbial forensics, Diatoms- Types, morphology, methods of isolation and their Forensic importance, Identification of pollen grains and and its Forensic Importance.

UNIT- II

Blood: Composition and Histology, Identification of blood and blood stains, Examination of dried blood. Determination of species, Grouping of Blood stains and their techniques; ABO, Rh and MN system, Genetic markers and their classification.

UNIT- III

Morphological structure of spermatozoa of human, confirmatory test for a spermic semen- p-30, Identification and examination of other body fluids/stains-vaginal, saliva, urine, pus, vomit, milk, sweat and tears etc.

UNIT -IV

DNA: Introduction, Source and Structure, DNA Profiling techniques, Forensic Significance of mt DNA and Y chromosome, DNA Polymorphism, PCR and RFLP methods of biological fluid analysis; Identification methods of wild life materials and Entomological evidences.

Recommended Books

1. Robertson, J. (1996): Forensic Examination of Hair. Taylor and Francis, USA.
2. Modi, J.K.: Medical Jurisprudence and Toxicology, N.M. Tripathi Pvt. Ltd.
3. Fraser, Roberts J.A (1965): An introduction to Medical Genetics.
4. Chatterjee, C. C- (1975): Human Physiology.
5. Boorman, K. E: Blood Group Serology, Churchill, and Lincoln, P. J. (1988)
6. Race, R. R. and Sangar, R. Blood Groups in Man. Blackwell Scientific, Oxford.
7. Saferstein, R. (1982): Science Handbook, Vol. I, II and III, Prentice Hall,
8. Barris, H. and Hopkinson, D. A. (1976): Handbook of Enzyme, Electrophoresis, Elsevier, North, Holland, New York.
9. Gilblet, E. (1969): Marker's in Human Blood, Davis, Pennsylvania.
10. Culliford, B. E. (1971), the examination and Typing of Blood Stains, US Deptt of Justice, Washington.
11. Chowdhuri, S. (1971): Forensic Biology, B P R & D, Govt. of India.
12. Dunsford, I. and Bowley, C. (1967): Blood Grouping Techniques, Oliver & Boyd, London.
13. Eckert, W. G. & James, S.H. (1989): Interpretation of Blood Stain, Evidence, Elsevaier, New York.
14. Coyle, H. M, Forensic Botany, CRC Press
15. Working procedure manual: Biology/ Serology; DFS, New Delhi

**Five Year Integrated UG/PG Course in
Forensic Science Semester – IX, IFSC- 904**

Paper – IV

Forensic Medicine

Maximum Marks: 100

Allotted credits:

03

Unit-I

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

Unit II

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

Unit - III

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

Unit -IV

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

Recommended Books

1. David Dolinak, Evan Matshes , Emma O. Lew .Forensic Pathology: Principles and Practice , Academic Press
2. Dominick DiMaio , Vincent J.M. DiMaio M.D. Forensic Pathology, Second Edition (Practical Aspects of Criminal & Forensic Investigations) CRC Press.
3. Matshes & Dolinak & Lew Forensic Pathology, Principles and Practice 1st Edition Academic Press
4. Jay Dix , Robert Calaluce, M Guide to Forensic Pathology,. CRC
5. Vincent J.M. DiMaio , Suzanna E. Dana Handbook of Forensic Pathology, Second Edition, CRC
6. Richard Shepherd. Simpson's Forensic Medicine, Hodder Arnold;
7. Payne-James, Jason (ed.; et al.) Encyclopedia of Forensic & Legal Medicine. Amsterdam; Boston: Elsevier Academic Press
8. Werner U. Spitz (Author, Editor), Daniel J. Spitz. Spitz and Fisher's Medicolegal Investigation of Death: Guidelines for the Application of Pathology to Crime Investigation [Hardcover] Charles C Thomas Pub Ltd
9. Parikh C.K. Text book of Medical Jurisprudence, forensic medicine and toxicology. CBS Publishers and Distributors , New Delhi
10. Subrahmanyam B.V.; Modi's Medical Jurisprudence & Toxicology, LexisNexis Butterworths, India .

**Five Year Integrated UG/PG Course in
Forensic Science Semester – IX, IFSL - 905**

Paper –V

**Practical based on Forensic Ballistics
and Physics**

Maximum Marks: 100

Allotted credits: 03

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

Five Year Integrated UG/PG Course in
Forensic Science Semester – IX, IFSL - 906
Paper –VII

Practical based on Forensic Biological and

Serological analysis Maximum Marks: 100 Allotted

credits: 03

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

**Five Year Integrated UG/PG Course in
Forensic Science Semester - IX, IFSL- 907**

Paper – 907

Maximum Marks: 50

Allotted credits: 02

Seminar based on any relevant topics taught from the above Four Theory Papers in Current Semester.

**Five Year Integrated UG/PG Course in
Forensic Science Semester – X, IFSC-1001**

Paper – I

**Quality management & research
methodology**

Maximum Marks: 100

Allotted credits: 03

UNIT- I

Elements of a Quality Management System: Quality, Total Quality, Quality assurance, Quality control Quality system. Quality Planning, Quality Audit: Internal and External Audit & MRM, History and development of ISO, Terminology of NABL. Benefits of ISO9000 series of standards. ISO9001 Requirements.

UNIT -II

Essential requirements for the competence of testing and calibration laboratories Introduction, scope, management Requirements: Organizational, Documents control, Review of requests and Calibrations, Purchasing service and supplies, service to the clients, complaints, corrective and preventive action, control of records

UNIT -III

Sampling: sampling procedures (random and non random), sampling statistics, Physical state, homogenization, size and hazards in sampling, Significance of statistics in forensic science. Basic concepts of frequency distribution, measure of central values - Mean, median and mode, measures of dispersion, Range, Mean deviation and standard deviation, Correlation and Regression analysis. Probability- Definition, Theory, Classical and types.

UNIT- IV

Meaning of research Problem: Research, definition, Objectives of research. Types of research-From the view point of application, Objectives, Inquiry mode. Search for existing literature, hypothesis, Interpretation and report writing.

Recommended Books:

1. ISO/IEC/17025:2005, NABL NABL -113, NABL -113A, 131, guidelines of NABL.
2. International Standard on General requirements for the competence of testing and calibration laboratories, 1st Ed., 1999-12-15, ISO/IEC 17025:1999(E). C.G.G.
3. Kothari, C.R. Research Methodology Methods and Techniques. Wiley Eastern Limited, New Delhi.
4. Saferstein R. Forensic Science Handbook I, II, III.
5. William L. Duncan: Total Quality, Key Terms and Concepts.
6. Murray S. Cooper: Quality control in the Pharmaceutical Industry.
7. John T. Rabbitt, Peter A Bergh: The ISO 9000 Book.
8. Willard Merritt, Dean & Settle: Instrumental Methods of Analysis.
9. Jami St. Clair Crime Laboratory Management: Academic Press.
10. Thomas A The laboratory Quality Assurance system: A manual of Quality Procedures and forms.
11. Ratliff. 2003 3rd ed. John Wiley & Sons.
12. Gary B Clark Systematic Quality Management. Practical Laboratory Management Series.

Five Year Integrated UG/PG Course in
Forensic Science Semester – X,
IFSE-1002 (a)
Paper – II Advanced
Forensic Chemistry

Maximum Marks: 100

Allotted credits: 03

UNIT -I

Analysis of beverages: Alcoholic and non-alcoholic beverages, IMFL, country made liquor, licit and illicit liquors, Analysis of Proof spirit, Rectified spirit, denatured spirits, Special denatured spirit, Blood alcohol analysis by chemical methods; Significance of blood alcohol, Breath Screening devices

UNIT -II

Arson: chemistry of fire, pattern of fire, investigation and evaluation of clue material, analysis of arson exhibits by instrumental method, Examination of petroleum products: distillation and fractionation, standard methods of analysis of petroleum products like kerosene, petrol, diesel, lubricating oil, greases.

UNIT -III

Drugs of abuse: introduction, classification of drugs of abuse, drugs of abuse in sports, designers drugs and their forensic examination. Qualitative and quantitative analysis of Opium and opiates. Forensic examination of precursor chemicals and drugs under NDPS Act 1985

UNIT -IV

Analysis of trace evidence: cosmetics, dyes, paints, pigments, fibers, oils, fats, greases, soil and industrial dusts, chemicals; Analysis of corrosive chemicals- acids and alkalies; Chemistry and examination of detective dyes use in trap cases; Examination of cement and concrete, consumer item as gold, silver etc.

Recommended Books:

1. Clark, E.G.C.: Isolation and identification Drugs, Vol. I and Vol.II, (1986).
2. Vogel's Qualitative Inorganic Analysis (7th Edition) revised by G.Svehia (2nd Impression-2006).
3. Working Procedure Manual – Chemistry, DFS Publications (2005).
4. IS:3752; 1988 Indian Standard Alcoholic Drinks – Methods of Test, First Revision (1988)
5. IS:323-1959, Indian Standard Specification for rectified sprit, revised, 9th reprint, December(1989)
6. The ISI Specification for Kerosene (IS: 1459/1974)
7. The ISI Specification for Motor Gasoline (IS: 2796/2000)
8. The ISI Specification for Diesel (IS: 1460/2000)
9. The Indian Standard Methods of Test for Petroleum Products IS:1448
10. The ISI Specification for Gear Lubricants (IS: 2297/1997)
11. The ISI Specification for Petroleum Hydrocarbon Solvents (IS: 1745/1978)
12. Fire and Arson Investigation, J. Kennedy, Chicago (1962)
13. Forensic Science Hand Book, by Saferstein, R., Printice Hall : N. Jersey, 1982

Five Year Integrated UG/PG Course in
Forensic Science Semester – X IFSE- 1002 (b)

Paper –II

Advanced Forensic Toxicology and
Pharmacology

Maximum Marks: 100

Allotted credits: 03

UNIT- I

Poisons: Definition, classification, types of poisoning, collection and preservation of toxicological exhibits in fatal and survival cases, mode of action and its effect on vital functions, specific analysis plan/ approach to toxicological examination of poisoning samples, significance and concept of forensic toxicological examination and law relating to poison.

UNIT – II

Extraction, Isolation/Separation and clean-up procedures of poisons and drugs: using conventional as well as modern techniques, Identification and estimation of following poisons from viscera, blood and urine, Barbiturates Benzodiazepines and its derivatives, Amphetamines. Insecticides/ Pesticides: Organochloro, organophosphorus and carbamates.

UNIT - III

Vegetable poisons: Nature, type, mode of action, extraction, isolation, Identification of the Poisonous seeds, fruits and roots. Animal Poisons: Snake venom, composition, site of action, mode of action, effect on the body as a whole, and tests for identifications, Analysis of metallic poisons. Carbon monoxide poisoning: significance, signs and symptoms, methods of diagnosis, tests for identification.

UNIT –IV

Forensic Pharmacological studies, Ingestion of drugs ,absorption, distribution, metabolism, pathways of drug metabolism, drug metabolism and drug toxicity, excretion of drugs and poisons, detection of poisons on the basis of their metabolic studies, interpretation of analytical data and forming of opinion. Spectrum of Toxic Effects, Dose and Response, Absorption, Distribution, Excretion and Influencing Factors; Dose – Response Relationship – Lethal dose 50, Effective dose 50

Recommended Books:

1. Curry, A.S.: Poison Detection in Human Organs, C. Thomas Springfield, Illinois USA,(1963).
2. Clark, E.G.C.: Isolation and identification Drugs, Vol. I and Vol.II, (1986)
3. Working Procedure Manual – Toxicology, DFS Publications (2005)
4. Sunshine, I: Guidelines for Analytical Toxicology Programme, Vol. I, CRC Press, (1950).
5. Michael J. Deverlanko etal: Hand Book of Toxicology CRC Press, USA (1995)
6. Parikh C.K; Text Book of Medical Jurisprudence Forensic Medicines and Toxicology. CBS Pub. New Delhi (1999)
7. Goutam,M.P. and Goutam ,S Analysis of Plant Poison,Selective & Scientific Books,New Delhi
8. Balraj S. Parmar etal; Pesticide Formulation, CBS Publishers, New Delhi (2004)
9. Cravey R.H, Baselt, R.C; Introduction to Forensic Toxicology, Biochemical Pub. Davis C A (1981)
10. Niesink RJM; Toxicology- Principles and Applications, CRC Press (1996).
11. Sunshine, I: Handbook of Analytical Toxicology, Press, (1969).

Five Year Integrated UG/PG Course in
Forensic Science Semester – X,
IFSE-1002 (c)

Paper –II Drugs
of abuse

Maximum Marks: 100

Allotted credits: 03

UNIT –I

Drugs of abuse: Introduction, Classification of drugs of abuse, Introduction to Narcotics of Natural Origin, Semi-Synthetic & Synthetic Narcotics, Stimulants Cannabis, Depressants, Hallucinogens and Inhalants, drug addiction and its problems. (NDPS Act) 1985 and its Amendments, Aim and objectives of Narcotics Control Bureau and Central Bureau of Narcotics.

UNIT –II

Analytical methods of testing- Active principles of narcotic drugs of natural origin, synthetic and semi-synthetic Narcotics by chemical and instrumental methods, Analysis of psychotropic substances e.g. psilocybin containing mushroom and peyote cactus, Analysis of rave drugs and sports drugs.

UNIT –III

Herbal drug: Introduction, Taxonomy, Macroscopic and microscopic characteristics, Forensic analysis by presumptive tests, Colour tests, TLC , GC-FID, GC-MS and HPLC.

UNIT IV

Designer Drugs – Introduction, Definition, Field and laboratory tests of Identification for Fentanyl Analogue, PCP Analogues, Amphetamine and Methamphetamine Analogue and Meperidine Analogue. Basic concepts of Drug abuse in sports.

Recommended Books:

1. Simon Wills ,Drugs of abuse ,Pharmaceutical Press, USA
2. A, Drugs of abuse. ,Practice Management Information Corp U. K
3. Lauri S. Friedman, Jennifer L. Skancke Athletes and Drug Use, Green haven Press, USA.
4. Paul K. Roberts Steroid Use and Abuse ,Nova Science Publishers ,USA
5. UNODC Recommended methods for the identification and analysis of cannabis and cannabis products Manual for use by National Drug Testing Laboratories United Nations office on drugs and crime, Vienna.
6. K. Valter , P. Arrizabalaga , J.C. Landry, Designer Drugs Directory. Elsevier Science, Switzerland.
7. Lawrence Clayton Designer Drugs Rosen Pub Group, New York
8. Lawrence Clayton, Tranquilizers, Enslow, Berkeley.
9. United Nations Drug Control Programme, Recommended Methods for Testing Lysergide (LSD).
10. Goutam, M. P. and Goutam, S, Analysis of Plant Poison, Selective & Scientific Books, New Delhi.
11. Working Procedure Manual: Chemistry DFS, Pub. (2005)
12. Saferstein. R,Forensic science Hand Book,Vol I& II,Prentice Hall

Five Year Integrated UG/PG Course in
Forensic Science Semester – X,
IFSE- 1002 (d)

Paper –II
Advanced Forensic Physics

Maximum Marks: 100

Allotted credits: 03

UNIT – I

Soil as evidence and challenges to forensic scientist, Composition and types of soil, Methods of examination of Preliminary discrimination methods and Density gradient tube technique. Glass: Types of glass and their composition, examination of glass fractures under different conditions, determination of direction of impact: cone- fracture, rib marks, hackle marks, backward fragmentation, colour and fluorescence, physical matching, density comparison, physical measurements, Refractive index by Refractometer, Elemental analysis, Interpretation of glass evidence.

UNIT- II

Tool marks: Types of tool marks: compression marks, striated marks, combination of compression and striated marks, repeated marks, class characteristics and individual characteristics, tracing and lifting of marks. Physical, chemical and instrumental methods of examination of strings/ropes, fibers, threads & fabrics, Wires/cables, seals, counterfeit coins, Physical match of broken objects. Restoration of erased/obliterated marks in different surfaces.

UNIT –III

Forensic analysis of paint: Macroscopic & instrumental analysis like IR spectroscopy, Raman spectroscopy & X-ray diffraction, elemental analysis, Interpretation of Paint evidence.

UNIT- IV

Speaker identification and tape authentication: Introduction to techniques of pattern recognition and comparison .Legal aspects. Principle and forensic application of Brain fingerprinting, Narco analysis and Lie detection.

Recommended Books

1. C.E.O Hara and J.W. Osterburg; An Introduction to Criminalistic, Indiana University Press, Blomington.
2. Raymond C Murray & John C.F Tedrew; Forensic Geology, Prentice Hall NJ
3. Working Procedure Manual : Physics DFS, New Delhi Publication (2000)
4. B. Caddy; Forensic Examination of Glass and Paints Analysis and Interpretation ISBN
5. Goutam, S and Goutam, M.P.: Physical Evidences-Introduction & Bibliography on their Forensic Analysis. Shiv Shakti Book Traders, New Delh
6. James Michael Curran, Tachia Natilie Hicks and John S.Buckleton; Forensic Interpretation of Glass Evidence, CRC Press (2000)
7. David A. Crown; The Forensic Examination of Paints and Pigments, Tolyor & Francis,
8. Jay A.Siegel, Pekka J Saukko and Geoffrey C. Koouper; Encyclopedia of Forensic Science, Academic Press (2000).
9. Robertson, J and Grieve, M, Forensic Examination of Fibers, CRC.
10. Philip Rose; Forensic Speaker Identification, Taylor and Francis, London.
11. Bengold & Nelson Moryson; Speech and Audio signal processing, John Wiley & Sons, USA (1999)

Five Year Integrated UG/PG Course in
Forensic Science Semester – X,
IFSE- 1002 (e)
Paper –II Advanced
Forensic Ballistics

Maximum Marks: 100

Allotted credits: 03

UNIT- I

Firearms, Definition , History, classification and characteristics of firearms. Examination and identification of fire arms. Identification of origin, improvised/ country-made/ imitative firearms and their constructional features, Velocity and pressure characteristics under different conditions; various types of bullets and compositional aspects, latest trends in their manufacturing and design

UNIT- II

Internal Ballistics: Definition, ignition of propellants, shape and size of propellants, manner of burning, Piobett's law, pressure space curve, shot start pressure. various factors affecting the internal ballistics: All burn point, velocity, space curve Le Due's formula, muzzle velocity, factors affecting muzzle velocity ,theory of recall

External Ballistics : Definition-trajectory drop in the flight of the projectiles force of gravity air resistance-base drag, Yaw, shape of bullet, (Spherical ball, Cylindrical-conical, flat nose ,round nose etc), effective range, extreme range.

Terminal Ballistics: Definition, behavior of various type of bullets on the target, remaining velocity, stopping power, Ricochet.

UNIT- III

Different types of marks produced during firing process on cartridge-firing pin marks, breech face marks, chamber marks, extractor and ejector marks and on bullet number/direction of lands and grooves, striation marks on the lands and grooves. Class and individual characteristics. Determination of range of fire-burring , scorching, blackening, tattooing and metal fouling, shots dispersion and GSR distribution, time of firing, different method employed, and their limitations Analysis of Gunshot Residues: Mechanism of formation of GSR.

UNIT -V

Firearm injuries: Evaluation of injuries caused due to shot-gun, rifle, handguns and country made firearms, methods of measurements of wound ballistics parameters, post-mortem and anti mortem firearm injuries; Report writing and expert's evidence.

Recommended Books:

1. Arms Act, 1959. And Arms Rule, 1962.
2. Working Procedure Manual: Ballistics, DFS New Delhi Publication,20005.
3. Bhattacharyya C.N., (2000) Particle Analysis for Detection of Gunshot Residues – A State-of-the-Art Technique, The Indian Police Journal, BPR&D, Vol.XLVII, No. 4, pp. 113-127
4. Burrad, G., (1951) The Identification of Firearm and Forensic Ballistics, Herbert, Jenkins, London.
5. Kumar, K., (1987) Forensic Ballistics in Criminal Justice, Eastern Book Co
6. Davis, J.E., (1958) An Introduction to Tool marks, Firearms and the Striagraph Charles C 7. Thomas, Springfield, Illinois, USA.

8. DiMaio, J.M., (1985) Gunshot Wounds, Elsevier, USA.
9. Feigl, F., (1962) Spot Tests in Inorganic Analysis, Elsevier Publishing Co., Netherlands.

Five Year Integrated UG/PG Course in
Forensic Science Semester – X,
IFSE- 1002 (f)

Paper –II
Questioned Documents

Maximum Marks: 100

Allotted credits: 03

UNIT – I

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

UNIT – II

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

UNIT – III

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

UNIT -IV

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

Recommended Books:

1. Ordway Hilton; Scientific Examination of Questioned Documents, Elsevier, NY
2. Albert S. Osborn; Questioned Documents, 2nd Ed., Universal Law Pub., Delhi
3. Albert S Osborn; The Problem of Proof, 2nd Ed., Universal Law Pub. Delhi
4. Charles C. Thomas; I.S.Q.D. Identification System for Questioned Documents, Willy Prior Bates Springfield, Illinois, USA
5. Wilson R. Harrison; Suspect Documents Their Scientific Examination, Universal Law Pub. Delhi Indian Reprint
6. Goutam, Shubhra and Goutam M.P. Physical Evidences- Introduction and Bibliography on their forensic analysis, Shiv Shakti Book Traders, New Delhi.
7. Morris Ron N; Forensic Handwriting Identification, Acad .Press, London (2001)
8. Lerinson Jay; Questioned Documents, Acad Press, London
9. Mcmenamin, G. R; Forensic Linguistics- Advances in Forensic Stylistics, CRC
10. Ellen David; Questioned Documents- Scientific Examination, Taylor & Francis, Washington (1997)
11. H.L. Blitzer and J.Jacobia; Forensic Digital Imaging and Photography, Academic Press (2002)

Five Year Integrated UG/PG Course in Forensic Science

Semester – X, IFSEL- 1002 (g)

Paper –II

Forensic Photography

Maximum Marks: 100

Allotted credits: 03

Unit I:

Photography definition and scope, Introduction to Camera, lens, shutter depth of film

Unit II:

Videography, Videography for fire and crime scene, motor vehicle accident scene, surveillance photography and photographic aspects of injuries.

Unit III:

Basics of Digital photography, digital imaging, resolution, digital cameras, Monitors and scanners.

Unit IV:

Crime scene photography, photography of foot and fingerprints, Significance of photography in document examination, Photography in hit and run cases.

References:

1. David R Redsicker: The practical methodology Forensic photography: (second edition) CRC press
2. Duckworth J E: Forensic photography. Springfield I L. Charles C Thomas
3. Samsone SJ: Modern photography for police and fireman, Cincinnati TI OH WH. Anderson Company. 1971.

**Five Year Integrated UG/PG Course in
Forensic Science Semester – X, IFSEL- 1002 (h)**

Paper –II

Biometrics (Through Portrait parle technique)

Maximum Marks: 100

Allotted credits: 03

Unit I:

History and definition of Biometrics, Types, features and function of Biometrics, Gait scan and principles. Face, voice, signature scan and their principles.

Unit II:

Fundamentals of fingerprints, History, Fingerprint patterns, Definition of patterns: Arch, Loop and Whorl, Ridge counting and Ridge tracing, Henry's system of classification (primary to key classification).

Unit III:

DNA and its principles in personal identification

Unit IV:

Introduction to skin prints, lip prints, ear prints, bare foot prints and their significance in personal identification, conventional method for development of Latent fingerprints.

References:

1. Ellen David; Questioned Documents- Scientific Examination, Taylor & Francis, Washington (1997).
2. H.L. Blitzer and J. Jacobia; Forensic Digital imaging and Photography, Academic Press (2002).
3. R.E. Jaconson, S.F. Ray, G.G. Attridge, N.R. Oxford; The Manual of Photography- Photographic and Digital Imaging, 9th Ed., Focal Press (2000).
4. B.H.E. Jacobson, Ray GG Attridge; The Manual of Photography, Focal Press, London (1998).
5. Upton, Kobre, Brill; Photography, Pearson Education, Inc.
David R. Redsicker; the Practical Methodology of Forensic Photography- 2nd Ed. CRC Press LLC(2001).

**Five Year Integrated UG/PG Course in
Forensic Science Semester – X, IFSEL- 1002 (i)**

Paper –II

Biometrics (Through Portrait parle technique)

Maximum Marks: 100

Allotted credits: 03

UNIT – I

Hair- Introduction and forensic Evidential Value; Morphology, Anatomy, Chemistry of Hair; The scene of occurrence; Collection, sampling and preservation of Hair; Human Hair Characteristics, Somatic origin of human hair; Morphological Examination: Ends, Root present/ absent, Tapered tips (uncut) Rounded or abraded, Square cut/ Angular cut Crushed/ Burned, Distal ends, Broken.

UNIT – II

Microscopic Examination of Hair; Drug analysis in Hair; Analytical methods of analysis; Elemental analysis of Hair and its forensic aspects; Morphological changes of hairs by Disease; Pigmentation, Color treatments; Temporary dyes, rinses, sprays, gels, mousses, Bleaches or lighteners, Hair spray and Hair gel; mtDNA Profiling of Hair and its forensic significance.

UNIT – III

Forensic Osteology: Basic Biology of human skeleton; Number and types of bones in human body; Collection, packaging and storage of human skeletal remains; Distinguishing Humans from other non-human skeletal remains. Use of fragmentary long bones in stature reconstruction. Racial differences in human skeleton, Other techniques of identifying skeletal remains: Facial reconstructions, Cranio facial superimposition, Video superimposition,

UNIT – IV

Forensic Biology: Introduction to Human Genome, DNA Extraction, DNA Quantitation, DNA Amplification by Ploymerase Chain Reaction, DNA detection methods, Forensic DNA Profiling, VNTR profiling, Autosomal STR profiling, Y chromosome profiling, Mitochondrial DNA profiling, DNA Databases, Diatoms- types, morphology, methods of isolation from different tissue and forensic significance in drowning cases.

Recommended Books:

1. Robertson, J. (1996): Forensic Examination of Hair. Taylor and Francis, USA.
2. Goutam Shubhra. ; An Introduction to Forensic Hair Examination; Selective and Scientific Book, New Delhi
3. Fazekas, I Gy; Forensic m foetal Osteology, Akademiai Kiado(1978)
4. Singh, Inderbir; Human Osteology, Jayee Brothers, (2004)
5. Joseph, J; Human Osteology, Jaypee Brothers, (1996)
6. Marion, Krogman Wilton; Human skeleton in forensic medicine, Charles C Thomas, (1986)
7. Singh, Inderbir; Textbook of human osteology, Jaypee Brothers, (2002)
8. P.L. Williams & R. Warwick; Gray' Anatomy, Churchill Livingstone, London,(1980)
9. Krogman, W.M.. The Human Skeleton in Forensic Medicine, Chalres C Thomas, Springfield, (1973)
10. K.J. Reich; Forensic Osteology: Advances in the identification of Human remains, Charles C Thomas, (1998)
11. William M. Bass; Human Osteology: A Laboratory and Field Manual, Missouri Archaeological Society (1995)

**Five Year Integrated UG/PG Course in
Forensic Science Semester – X, IFSE 1002 (j)**

Paper –II

**Advanced Forensic Serology &
Immunology**

Maximum Marks: 100

Allotted credits: 03

UNIT-I

Blood: Composition and functions, collection and species identification, Structure and function of serum proteins, Hemoglobin and its variants, Haptoglobins. **Blood groups** – history, biochemistry and genetics of ABO, Rh, Mn and other systems. Methods of ABO blood grouping (absorption-inhibition, mixed agglutination and absorption elution) from blood stains and other body fluids/stains viz. menstrual blood, semen, saliva, sweat, tear, pus, vomit, hair, bone, nail. Secretors and non-secretors . Blood groups that make racial distinctions.

UNIT-II

Analysis of Blood in Forensic Serology: Identification of blood, Chemical test for Blood identification, Species Origin determination in Blood Stains. **Blood Pattern Analysis:** History of Bloodstain Pattern interpretation, Properties of human blood, Size, Shape and Directionality of bloodstains, Spattered blood, other Bloodstain Patterns, Interpretation of Bloodstain on clothing and footwear.

UNIT-III

Forensic Identification of Biological Fluids and Stains: Composition of Semen and morphology of spermatozoa, identification of Semen, Qualitative Assays of seminal fluids: Acid phosphatase, Microscopic identification of Spermatozoa, Oligospermia and Azoospermia. Identification of Azoospermic Semen stains, Prostate specific Antigen (PSA, P30) as an indicator of Semen. Saliva: Composition, Identification tests

UNIT-IV

Immunology: Immune system, immune response, innate and acquired immunity and antigens, Immunoglobulin: Types, physio-chemical properties and function, Rising of antisera. Lectins: Forensic significance, buffers and serological reagents, methods of sterilization employed for serological work. Antigen-Antibody Reactions: Precipitation, agglutination, complement, neutralization, immunofluorescence.

Recommended Books

1. Working Procedure Manual Serology, DFS, New Delhi.
2. Danniell P. Stites, Abba I. Jerr, Tristram G. Parstow Medical immunology, Ninth edition; Prentice Hall International Inc. 1997.
3. Saferstein, R. (1982): Science Handbook, Vol. I, II, & III, Prentice Hall New Jersey.
4. Stern, C. (1964) : Principles of Human Genetics, Freeman, California.
5. Beerman, K.E.: Blood Group Serology, Churchill, and Lincoln, P.J. (1988)
6. Race, R.R, and Sanger, R. (1975) : Blood Groups in Man. Blackwell Scientific, Oxford.
7. Gilblet, E. (1969) : Markers in Human Blood, Davis, Pennsylvania
8. Culliford, B.E. (1971) The Examination and Typing of Blood Stains, US Deptt. of Justice, Washington

9. Chowdhari, S. (1971) : Forensic Biology, B P R & D, Govt, of India.
10. Dunsford, I and Bowley, C. (1967) : Blood Grouping Techniques, Oliver & Boyd, London

**Five Year Integrated M.Sc. Forensic
Science Semester – X, IFSE-
1003 (k)**

Paper –II

Forensic genetics & DNA profiling

Maximum Marks: 100

Allotted credits: 03

UNIT- I

DNA: An Introduction to Genetic Material, Structure of DNA, denaturation and renaturation of DNA, DNA binding proteins, factors affecting DNA stability, DNA Damage & repair, Chemical nature of DNA, Replication of DNA in prokaryotes and eukaryotes, genetic code, degeneracy and universability of genetic code, transcription and translation machinery.

UNIT –II

Elements of human genetics: Introduction, heritability, human genetic variations, human chromosomes, Mendelian inheritances: Dominant inheritance, recessive inheritance, sex-linked inheritances, polymorphic traits; Heritable human diseases; Metabolic/molecular basis and detection of inherited disease, gene mapping; Genetic markers and their forensic significance.

UNIT- III

Biological evidence- Sources collection, characterization and storage; DNA extraction and Quantification; General principles of DNA extraction and quantification; Basic concept of sequence variation - VNTRs, STRs, Mini STRs, SNPs. Detection techniques- RFLP, PCR amplifications, Y-STR, Mitochondrial DNA Evaluation of results, frequency estimate calculations and interpretation, Allele frequency determination, Match probability – Database

UNIT –IV

STR Profiling: Structure of STR loci; The development of STR multiplexes; Detection of STR polymorphisms; Interpretation of result; Assessment of STR profiles: Stutter peaks. Sp. Pull-up; Degraded DNA; Statistical Assessment of STR profiles ; estimating the frequencies of STR profiles. History of DNA profiling applications in disputed paternity cases, child swapping, missing person's identity, civil immigration, limitations of DNA profiling, Analysis of SNP, DNA chip technology- Microarrays Cell free DNA, DNA typing from blood, semen, bone and teeth and the use of DNA typing in wildlife investigations.

Recommended Books:

1. Saferstein, Richard, Handbook of Forensic Science, Vol. I, II, (Ed.) Prentice Hall, Eaglewood Cliffs, NJ;
2. William Goodwin, Adrian Linacre, Sibte Hadi; An introduction to forensic genetics John Wiley & son's ltd, UK.
3. Coyle, H. (ed.) Nonhuman DNA Typing, International Forensic Science and Investigation Series, CRC Press, Boca Raton.
4. Linacre, A. (ed.) Forensic Science in Wildlife Investigations, International Forensic Science and Investigation Series, CRC Press, Boca Raton.
5. Bruce Budowle, Steven. Schutzer, Roger G. Breeze and Paul S. Keim Microbial Forensics.
6. Niels Morling, Handbook of Forensic Genetics (Forensic Science and Medicine) Humana Press.

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

**Five Year Integrated UG/PG Course in
Forensic Science Semester – X, IFSEL – 1004**

(a)
Paper –IV

**Practical based on Advanced Forensic
Chemistry**

Maximum Marks: 100

Allotted credits: 04

1. Analysis of liquor sample as per BIS Specification.
2. Analysis of kerosene/Diesel as per BIS Specification.
3. Detection of kerosene adulteration in gasoline by instrumental analysis.
4. Analysis of opiates, cannabis, Amphetamines, benzodiazepines
5. UV/VIS Spectrophotometric analysis of Narcotic Drugs
6. Detection of blue dye in kerosene(PDS Kerosene)
7. Detection of phenolphthalein in alkaline solution.
8. TLC separation of anabolic steroid
9. Qualitative analysis of explosive residues
10. Detection of Adulterants in edible oils

**Five Year Integrated UG/PG Course in
Forensic Science Semester – X,
IFSEL- 1004(b)**

Paper –IV

**Practical based on Advanced Forensic
Toxicology**

Maximum Marks: 100

Allotted credits: 04

1. Analysis of Viscera (simulated sample) for organochloro / organo phosphorous pesticides by chromatographic and spectroscopic methods
2. Systematic extraction and identification of acidic and basic drugs from viscera (simulated samples).
3. Detection of metallic poisons (arsenic and mercury) in viscera and food stuff (simulated samples).A
4. Analysis of narcotic drugs-colour tests and TLC analysis.
5. Microscopic examination of Plant Poisons.
6. Identification of Cannabinoids by TL
7. Analysis of Solanum alkaloids by colour tests and TLC analysis

8. Chemical analysis of Strychnine and Brucine –colour tests and TLC.
9. Identification of poisonous seeds- Ricinus, Croton and Argemone..
10. Identification of methanol mixed in ethanol.

**Five Year Integrated UG/PG Course in
Forensic Science Semester – X, IFSEL-1004(c)**

Paper –IV

Practical based on Drugs of Abuse

Maximum Marks: 100

Allotted credits: 04

1. Analysis of Benzodiazepines and Amphetamines by Laboratory and Field tests
2. Identification of cannabis & Amphetamines by Thin layer chromatographic method
3. TLC separation of anabolic steroids.
4. Microscopic examination of narcotic drugs of plant origin
5. Analysis of Barbiturates by instrumental methods-by HPLC/ Infra red spectroscopy.
6. UV/Vis Spectrophotometric examination of barbiturates ,amphetamines and benzodiazepines
7. Qualitative and Quantitative analysis of morphine
8. Analysis of Designer drugs

**Five Year Integrated UG/PG Course in
Forensic Science Semester – X IFSEL-1004(d)**

Paper –IV

**Practical based on Advanced Forensic
Physics**

Maximum Marks: 100

Allotted credits: 04

1. Restoration of erased identification marks
2. Comparison of soil samples by Density gradient method
3. Matching of broken pieces of different objects
4. Examination & comparison of broken Glass bangles
5. Identity of small glass pieces by flotation method.
6. Determination of refractive index of glass and liquids
7. Comparison of Tool marks
8. Comparison of Fibers , threads and ropes
9. Analysis and comparison of Paint samples
10. Examination of Glass fracture impact/heat/caused by projectiles

Five Year Integrated UG/PG Course in
Forensic Science Semester – X, IFSEL- 1004 (e)

Paper –IV

Practical based on - Advanced Forensic
Ballistics

Maximum Marks: 100

Allotted credits: 04

1. Chemical tests for powder residues (Walker's test) and Barrel wash
2. Identification of propellants
3. Examination and Comparison of fired Cartridges/cases (Caliber, firing pin, breech face, Extractor / Ejector marks etc.)
4. Determination of shot number from size and weight of shots.
5. Examination and Comparison of fired bullets – Caliber, rifling, characteristics, probable type of firearms
6. Characteristics of Firearms – Caliber, Choke, Trigger pull, Proof marks etc.
7. Determination of range of firing
8. Examination and Comparison of fired bullets – Caliber, rifling, characteristics, type of firearms
9. Restoration of Erased marking on firearm

Five Year Integrated UG/PG Course in
Forensic Science Semester – X, IFSEL-1004(f)

Paper –IV

Practical Based on Questioned
Document

Maximum Marks: 100

Allotted credits: 04

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

**Five Year Integrated UG/PG Course in
Forensic Science Semester - X, IFSEL- 1004 (g)**

Paper –IV

Practical based on Forensic Photography

Maximum Marks: 100

Allotted credits: 04

1. Photography of crime scene
2. Photography of Tyre print impressions
3. Photography of Hanging
4. Photography of trace evidencde
5. Photography of vehicular accidents

**Five Year Integrated UG/PG Course in
Forensic Science Semester- X, IFSEL- 1004 (h)**

Paper-IV

Practical based on Biometrics (Through Potrait

Parle Technique) Maximum Marks: 100 Allotted

credits: 04

1. Examination of photocopy documents for machine defect marks.
2. Detection and decipherment of alteration, additions and overwriting.
3. Detection of forgeries including traced and simulated forgery and built up documents.
4. Decipherment of indented writings, secret writings and charred documents.
5. Examination of security documents Currency notes, Stamp papers and Lottery tickets.
6. Examination of erasures-mechanical and chemical erasures.
7. Photography of documents/ Crime Scene.

**Five Year Integrated UG/PG Course in
Forensic Science Semester – X, IFSEL-1004 (i)**

Paper –IV

**Practical based on Advanced Forensic
Biology**

Maximum Marks: 100

Allotted credits: 04

1. Morphological examination of Human and Animal Hair
2. Examination & Comparison of Human Hair originated from different body parts
3. Determination of sex from Skull Sutures & Pelvis
4. Determination of age from teeth & Skull
5. To perform craniometrical measurements on skull
6. Examination of diatoms
7. Microscopic Examination of Pollen Grains

**Five Year Integrated UG/PG Course in
Forensic Science Semester – X, IFSEL- 1004 (j)**

Paper –IV

**Practical based on Forensic Serology and
Immunology**

Maximum Marks: 100

Allotted credits: 04

1. Examination of bloodstains: Catalytic Test, Crystal and Spectrophotometric method.
2. Determination of Grouping of blood stains by absorption elution, inhibition and mixed agglutination method.
3. Examination of urine and sweat.
4. Determination of Species of origin of blood, semen and saliva.
5. Examination of seminal stains by biochemical, microscopically and electro-immuno-diffusion method.
6. Preparation of Lectins and testing their activities against Body fluids & Tissues Analysis of biological fluids by Immuno-Electrophoresis method.

Five Year Integrated UG/PG Course in
Forensic Science Semester – X, IFSEL- 1004(k)
Paper –IV
Practical based on Forensic genetics and DNA
profiling

Maximum Marks: 100

Allotted credits: 04

1. Extraction and isolation of DNA from Blood
2. Extraction and isolation of DNA from saliva
3. Creating a Hybridization Reaction for DNA typing
4. To perform DNA Fragmentation Assay
5. Performing a Southern Blot in DNA analysis
6. DNA typing by PCR Method

**Five Year Integrated UG/PG Course in
Forensic Science Semester – X, IFSD 1004**

**Paper – IV Dissertation/Project
work**

Maximum Marks: 100

Allotted credits: 10

Dissertation / Project work & Seminar



**विभागाध्यक्ष
HEAD**

**फॉरेंसिक साइंस विभाग
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