



B.Sc. (Honors with Research) Forensic Science As per NEP2020

**[Prepared as per Curriculum and Credit
Framework for Undergraduate Programs
(CCFUP) given by UGC, 2022]**

Effective from 2025-26



Mahayogi Gorakhnath University Gorakhpur
Faculty of Health and Life Sciences
Department of Forensic Science

B. Sc. (Honors with Research) Forensic Science
Study Evaluation Scheme (As per NEP2020)
Effective from the session 2025-26

I Year: I Semester

S No	Course Code	Course	L	T	P	Evaluation Scheme		Total	Credits	Course Type
						CIE	ESE			
Theory										
1	BFS101	Introduction to Forensic Science	3	0	0	25	75	100	3	Major
2	BFS102	Crime Scene Management & Criminal Profiling	3	0	0	25	75	100	3	Major
3	BFS103	Crime and Society	3	0	0	25	75	100	3	Minor
4	BFS104	General Chemistry-I	3	0	0	25	75	100	3	Minor
5	BFS105	General Biology	3	0	0	25	75	100	3	MD
6	BFS106	Functional English	3	0	0	25	75	100	3	SEC
7	BFS107	First Aid and Health	2	0	0	25	75	100	2	VAC
Practical										
8	BFS151	Forensic Science Lab	0	0	2	25	75	100	1	Major
9	BFS152	Crime Profiling Lab	0	0	2	25	75	100	1	Major
10	BFS153	General Chemistry-I Lab	0	0	2	25	75	100	1	Minor
Total			20	0	6	250	750	1000	23	

Evaluation Scheme, promotion scheme, grading system, and CGPA calculation adopted from CCFUP, by UGC 2022.

L	Lecture
T	Tutorial
P	Practical
CIE	Continuous Internal Evaluation
ESE	End Semester Examination
GE	Generic Elective
AEC	Ability Enhancement Course
SEC	Skill Enhancement Courses
DSE	Discipline Specific Elective
MD	Multidisciplinary
VAC	Value-Added Courses common for all UG



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I Year: II Semester

S No	Course Code	Course	L	T	P	Evaluation Scheme		Total	Credits	Course Type
						CIE	ESE			
Theory										
1	BFS201	Criminal Law and Criminology	3	0	0	25	75	100	3	Major
2	BFS202	Fingerprint Science	3	0	0	25	75	100	3	Major
3	BFS203	Questioned Documents	3	0	0	25	75	100	3	Major
4	BFS204	General Chemistry-II	3	0	0	25	75	100	3	Minor
5	BFS205	General Physics-I	3	0	0	25	75	100	3	MD
6	BFS206	Artificial Intelligence Foundation and Applications	3	0	0	25	75	100	3	SEC
7	BFS207	Food, Nutrition and Hygiene	2	0	0	25	75	100	2	VAC
Practical										
8	BFS251	Criminology & Fingerprint Science Lab	0	0	2	25	75	100	1	Major
9	BFS252	General Chemistry-II Lab	0	0	2	25	75	100	1	Minor
10	BFS253	General Physics-I Lab	0	0	2	25	75	100	1	Minor
Total			20	0	6	225	675	1000	23	

Certificate Course in Forensic Science*

Evaluation Scheme, promotion scheme, grading system, and CGPA calculation adopted from CCFUP, by UGC 2022.

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GE	Generic Elective
AEC	Ability Enhancement Course
SEC	Skill Enhancement Courses
DSE	Discipline Specific Elective
MD	Multidisciplinary
VAC	Value-Added Courses common for all UG

*** UG Certificate:** Students who opt to exit after completion of the first year and have secured 40 credits will be awarded a UG certificate if, in addition, they complete one vocational course of 4 credits during the summer vacation of the first year. These students are allowed to re-enter the degree program within three years and complete the degree program within the stipulated maximum period of seven years.



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II Year: III Semester

S No	Course Code	Course	L	T	P	Evaluation Scheme		Total	Credits	Course Type
						CIE	ESE			
Theory										
1	BFS301	Analytical Techniques in Forensic Science	3	0	0	25	75	100	3	Major
2	BFS302	Forensic Psychology	3	0	0	25	75	100	3	Major
3	BFS303	Forensic Chemistry-I	3	0	0	25	75	100	3	Minor
4	BFS304	General Physics-II	3	0	0	25	75	100	3	MD
5	BFS305	Ethics in Forensic Science	3	0	0	25	75	100	3	Major
6	BFS306	Constitution of India	3	0	0	25	75	100	3	Minor
7	BFS307	Technical Writing and Presentation Skills	2	0	0	25	75	100	2	SEC
Practical										
8	BFS351	Forensic Psychology Lab	0	0	2	25	75	100	1	Major
9	BFS352	Forensic Chemistry-I Lab	0	0	2	25	75	100	1	Minor
10	BFS353	General Physics-II Lab	0	0	2	25	75	100	1	Major
Total			20		6	250	750	1000	23	

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L	Lecture
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II Year: IV Semester

S No	Course Code	Course	L	T	P	Evaluation Scheme		Total	Credits	Course Type
						CIE	ESE			
Theory										
1	BFS401	Forensic Biology and DNA Analysis	3	0	0	25	75	100	3	Major
2	BFS402	Forensic Medicine	3	0	0	25	75	100	3	Major
3	BFS403	Fundamentals of Forensic Toxicology	3	0	0	25	75	100	3	Major
4	BFS404	Forensic Chemistry-II	3	0	0	25	75	100	3	Minor
5	BFS405	Forensic Physics-I	3	0	0	25	75	100	3	AEC
6	BFS406	Data Science and AI in Forensics	3	0	0	25	75	100	3	SEC
7	BFS407	Human Values and Environmental Studies	2	0	0	25	75	100	2	VAC
Practical										
8	BFS451	Forensic Medicine and DNA Analysis Lab	0	0	2	25	75	100	1	Major
9	BFS452	Forensic Toxicology Lab	0	0	2	25	75	100	1	Major
10	BFS453	Forensic Physics Lab-I	0	0	2	25	75	100	1	Major
Total			20	0	6	250	750	1000	23	

Diploma in Forensic Science*

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ESE	End Semester Examination
GE	Generic Elective
AEC	Ability Enhancement Course
SEC	Skill Enhancement Courses
DSE	Discipline Specific Elective
MD	Multidisciplinary
VAC	Value-added courses common for all UG

*** UG Diploma:** Students who opt to exit after completion of the second year and have secured 80 credits will be awarded the UG diploma if, in addition, they complete one vocational course of 4 credits during the summer vacation of the second year. These students are allowed to re-enter within a period of three years and complete the degree programme within the maximum period of seven years.



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III Year: V Semester

S No	Course Code	Course	L	T	P	Evaluation Scheme		Total	Credits	Course Type
						CIE	ESE			
Theory										
1	BFS501	Forensic Anthropology	3	0	0	25	75	100	3	Major
2	BFS502	Digital Forensic and Cyber Law	3	0	0	25	75	100	3	Major
3	BFS503	Forensic Ballistics	3	0	0	25	75	100	3	Minor
4	BFS504	Forensic Physics-II	3	0	0	25	75	100	3	Major
5	BFS505	Forensic Photography	2	1	0	25	75	100	3	AEC
6	-----	Discipline Specific Elective -1	3	0	0	25	75	100	3	SEC
7	BFS506	Communication Skills and Personality Development	2	0	0	25	75	100	2	VAC
Practical										
8	BFS551	Forensic Anthropology and Forensic Physics-II Lab	0	0	2	25	75	100	1	Major
9	BFS552	Digital Forensic and Cyber Law Lab	0	0	2	25	75	100	1	Major
10	BFS553	Summer Training/Internship	0	0	4	25	75	100	2	SI
Total			19	1	8	250	750	1000	24	

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SI	Summer Internship

Discipline Specific Elective -1	
Course Code	Course Name
BFS521	Molecular Techniques
BFS522	Accident Investigation
BFS523	Food Toxicology
BFS524	Forensic Food Analysis



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III Year: VI Semester

S No	Course Code	Course	L	T	P	Evaluation Scheme		Total	Credits	Course Type
						CIE	ESE			
Theory										
1	BFS601	Information Security Audit and Compliance	3	0	0	25	75	100	3	Major
2	BFS602	Crime Scene Investigation Techniques	3	0	0	25	75	100	3	Major
3	BFS603	Immunology and Forensic Serology	3	0	0	25	75	100	3	Major
4	BFS604	Forensic Odontology	3	0	0	25	75	100	3	Major
5	-----	General Elective	3	0	0	25	75	100	3	MD
6	-----	Discipline Specific Elective -2	3	0	0	25	75	100	3	AEC
7	BFS605	Analytical Ability and Digital Awareness	3	0	0	25	75	100	3	VAC
Practical										
8	BFS651	Information Security Audit and Compliance Lab	0	0	2	25	75	100	1	Major
9	BFS652	Crime Scene Investigation Techniques Lab	0	0	2	25	75	100	1	Major
10	BFS653	Immunology and Forensic Serology Lab	0	0	2	25	75	100	1	Major
Total			21	0	6	200	600	800	24	

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General Elective	
Course Code	Course Name
BFS631	Pharmacology
BFS632	Food Product Regulations
BFS633	Forensic Pathology
BFS634	Medico-Legal Procedures

Discipline Specific Elective -2	
Course Code	Course Name
BFS621	Forensic Geology
BFS622	Forensic Accounting
BFS623	Forensic Handwriting
BFS624	Forensic Dermatoglyphics
BFS625	Forensic Metabolomics

***3-year UG Degree:** Students who wish to undergo a 3-year UG program will be awarded UG Degree in the Major discipline after successful completion of three years, securing 120 credits and satisfying the minimum credit requirement as given in table 2.



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IV Year: VII Semester

S No	Course Code	Course	L	T	P	Evaluation Scheme		Total	Credits	Course Type
						CIE	ESE			
Theory										
1	BFS701	Advanced Fingerprinting Technology	3	0	0	25	75	100	3	Major
2	BFS702	Forensic Genomics and DNA profiling	3	0	0	25	75	100	3	Major
3	BFS703	Forensic Pharmacy and Pharmacology of Controlled Drugs	3	0	0	25	75	100	3	Major
4	BFS704	Narcotic Drugs and Psychotropic Substances	3	0	0	25	75	100	3	Major
5	BFS705	Audio and Video Analysis	3	0	0	25	75	100	3	Minor
6	BFS706	Research Methodology-I	3	0	0	25	75	100	3	VAC
7	-----	Discipline Specific Elective -3	3	0	0	25	75	100	3	Minor
Practical										
8	BFS751	Advanced Fingerprinting Technology Lab	0	0	2	25	75	100	1	Major
9	BFS752	Forensic Genomics and DNA profiling Lab	0	0	2	25	75	100	1	Major
10	BFS753	Audio and Video Analysis Lab and Forensic Entomology Lab	0	0	2	25	75	100	1	AEC
Total			21	0	6	250	700	1000	24	

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Discipline Specific Elective -3	
Course Code	Course Name
BFS721	Forensic Entomology
BFS722	Mobile and Cloud Forensics
BFS723	Entrepreneurship in Forensic Science
BFS724	Fire, Arson, and explosive crime Investigation



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IV Year: VIII Semester

S No	Course Code	Course	L	T	P	Evaluation Scheme		Total	Credits	Course Type
						CIE	ESE			
Theory										
1	BFS801	Advanced Digital Forensics	4	0	0	25	75	100	4	Major
2	BFS802	Research Methodology-II	4	0	0	25	75	100	4	Major
3	BFS803	Research Publication Ethics	2	0	0	25	75	100	2	MD
Practical										
4	BFS851	Advanced Digital Forensics Lab	0	0	4	25	75	100	2	Major
Total			10	0	4	100	300	400	12	
OR										
1	BFS852	Research Project /Internship at Forensic Laboratory	0	0	24	25	75	100	12	Major

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***4-year UG Degree (Honours):** A four-year UG Honours degree in the major discipline will be awarded to those who complete a four-year degree program with 160 credits and have satisfied the credit requirements as given in table 2 in Section 5.

4-year UG Degree (Honours with Research): Students who secure 75% marks and above in the first six semesters and wish to undertake research at the undergraduate level can choose a research stream in the fourth year. They should do a research project or dissertation under the guidance of a faculty member of the University/College. The research project/dissertation will be in the major discipline. The students who secure 160 credits, including 12 credits from a research project/dissertation, are awarded UG Degree (Honours with Research).



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S.NO.	Broad Category of Course	Minimum Credit Requirement			
		3-year UG		4-year UG	
		As per UGC	MGUG Forensic Science	As per UGC	MGUG Forensic Science
1	Major (Core)	60	67	80*	91*
2	Minor Stream	24	28	32	34
3	Multidisciplinary	09	12	09	14
4	Ability Enhancement Courses (AEC)	08	9	08	10
5	Skill Enhancement Courses (SEC)	09	14	09	14
6	Value Added Courses common for all UG (VAC)	06 - 08	8	06 – 08	11
7	Summer Internship	02 - 04	2	02 – 04	2
8	Research Project / Dissertation	*For those who undergo 4 years of honors without research (Course credit included)		Only for Honors with Research	
				12	12
	Total	120	140	160	176

Table 1: Minimum Credit Requirements to Award Degree under 3-year and UG and 4-year UG Programs

Curriculum and Credit Frame Work for Undergraduate										
Category of course (Minimum credits by UGC)	I Semester (23)	II Semester (23)	III Semester (23)	IV Semester (23)	V Semester (24)	VI Semester (24)	3 Year UG (140)	VII Semester (21)	VIII Semester (12)	Total (173)
Major (60-80)	8	10	11	12	11	15	67	14	10*	91
Minor (24-32)	7	5	7	3	3	3	28	6	0	34
MD (9)	3	3	3	0	0	3	12	0	2*	14
AEC (8)	0	0	0	3	3	3	9	1	0	10
SEC (9)	3	3	2	3	3	0	14	0	0	14
VAC (6-8)	2	2	0	2	2	0	8	3	0	11
SI (2-4)	0	0	0	0	2	0	2	0	0	2
Research (12)	0	0	0	0	0	0	0	0	12**	12

*For those who undergo 4 years honors without research (Course credit included).

**For those who opt for honors with research

Table 2: Semester Wise distribution of minimum credits required for B.Sc. (Honours with Research) in Forensic Science



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Letter Grades and Grade Points:

Letter Grade	Grade Point
O (Outstanding)	10
A+ (Excellent)	9
A (Very Good)	8
B+ (Good)	7
B (Above Average)	6
C (Average)	5
P (Pass)	4
F (Fail)	0
Ab (Absent)	0

Computation of SGPA and CGPA

The following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

The SGPA is the ratio of the sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

$$\text{SGPA (Si)} = \sum(C_i \times G_i) / \sum C_i$$

Where C_i is the number of credits of the i^{th} course and G_i is the grade point scored by the student in the course.

Example for Computation of SGPA

Semester	Course	Credit	Letter Grade	Grade point	(Credit x Grade)
1	Course 1	3	A	8	$3 \times 8 = 24$
1	Course 1	4	B +	7	$4 \times 7 = 28$
1	Course 1	3	B	6	$3 \times 6 = 18$
1	Course 1	3	O	10	$3 \times 10 = 30$
1	Course 1	3	C	5	$3 \times 5 = 15$
1	Course 1	4	B	6	$4 \times 6 = 24$
		20			139
SGPA					$139/20=6.95$

The Cumulative Grade Point Average (CGPA) is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$\text{CGPA} = \sum(C_i \times S_i) / \sum C_i$$

where S_i is the SGPA of the semester and C_i is the total number of credits in that semester.

Example for Computation of CGPA

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
Credit:21	Credit: 22	Credit :25	Credit: 26	Credit: 26	Credit: 26
SGPA: 6.9	SGPA :7.8	SGPA: 5.6	SGPA: 6.0	SGPA:6.3	SGPA:8.0
CGPA=6.73 $(21 \times 6.9 + 22 \times 7.8 + 25 \times 5.6 + 26 \times 6.0 + 26 \times 6.3 + 25 \times 8.0)/145$					

The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.



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						CIE	ESE			
Theory										
1	BFS101	Introduction to Forensic Science	3	0	0	25	75	100	3	Major
2	BFS102	Crime Scene Management & Criminal Profiling	3	0	0	25	75	100	3	Major
3	BFS103	Crime and Society	3	0	0	25	75	100	3	Minor
4	BFS104	General Chemistry-I	3	0	0	25	75	100	3	Minor
5	BFS105	General Biology	3	0	0	25	75	100	3	MD
6	BFS106	Functional English	3	0	0	25	75	100	3	SEC
7	BFS107	First Aid and Health	2	0	0	25	75	100	2	VAC
Practical										
8	BFS151	Forensic Science Lab	0	0	2	25	75	100	1	Major
9	BFS152	Crime Profiling Lab	0	0	2	25	75	100	1	Major
10	BFS153	General Chemistry-I Lab	0	0	2	25	75	100	1	Minor
Total			20	0	6	250	750	1000	23	

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I Year: I Semester (THEORY)

Introduction to Forensic Science

Code: BFS 101

L	T	P	C
3	0	0	3

Course Objective: After studying this paper, the students will know:

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

UNIT I: History and Development of Forensic Science

Functions of forensic science. Historical aspects of forensic science. Definitions and concepts in forensic science. Scope and need of forensic science. Basic principles of forensic science. Frye case and Daubert standard.

UNIT II: Tools and Techniques in Forensic Science

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

UNIT III: Historical Development and Growth of Forensic Science Laboratories in India

Central and State Level Laboratories, Services and Functionalities provided by various FSLs, Various Divisions of the FSL. Mobile Forensic Science Laboratory: Its Functions and Utility. Introduction to Various Institutions: IITR, CCMB, CDFD, NCRB, CDTS.

UNIT IV: Organizational setup 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. Police Academies. Police dogs. Services of crime laboratories. Basic services and optional services

UNIT V: Domains in Forensic Science

Branches of Forensic Science, Police officers, Prosecution, Judicial Officers, and Medico-legal experts etc. Role and Qualifications of Forensic Scientists. Code of conduct for forensic scientists, Ethical issue in Forensic Science, professional standards for the practice of Criminalistics, sanctions against experts for unethical conduct

Suggested Reading:



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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. 9
7. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013).

Course Learning Outcome (CLO) This course introduces the principles of cell biology and genetics. After completion of this course, students will be able to-

1. Know about the basic principles and history of Forensic science in India and worldwide.
2. Understand the concept of expert witness and report writing with Indian justice system.
3. Know about the organizational set up of forensic science laboratories.
4. Understand the working and functioning of mobile forensic units.



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I Year: I Semester (THEORY)

Crime Scene Management & Criminal Profiling

Code: BFS 102

L	T	P	C
3	0	0	3

Course Objective: After studying this paper the students will know:

1. Get the basic concept and characteristics of crime.
2. Understand the present crime scenario in India.
3. Learn the application of scientific principles of forensic science for CSI.

UNIT I: Basics of Crime Scene and 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: Methods in the Management of 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: Crime Scene and Evidence Analysis

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. 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.

UNIT IV: Introduction to Criminal Profiling

Definition, aims and scope. Approaches to Criminal Profiling: Deductive profiling approach Inductive profiling approach Geographic profiling, Investigative psychology approach Behavioural Evidence Analysis (BEA), Types of Criminal Profiling, Role of Profiling in Criminal Justice System

UNIT V: Methods, Limitations and Applications of Criminal Profiling

Techniques of Profiling, Stages of Profiling Process, Limitations and Challenges, Role of Profiling in Indian Context, Recent Trends and Future Prospects

Suggested Reading:

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. D.E. Zulawski and D.E. Wicklander, Practical Aspects of Interview and Interrogation, CRC Press, Boca Raton (2002).
3. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004). 10



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4. J.L. Jackson and E. Barkley, *Offender Profiling: Theory, Research and Practice*, Wiley, Chichester (1997).
5. R. Gupta, *Sexual Harassment at Workplace*, LexisNexis, Gurgaon (2014)
6. Turvey, Brent E. – *Criminal Profiling: An Introduction to Behavioral Evidence Analysis*
7. Douglas, John E., and Olshaker, Mark – *Mindhunter: Inside the FBI's Elite Serial Crime Unit*
8. Egger, Steven A. – *The Killers Among Us: An Examination of Serial Murder and Its Investigation*
9. Holmes, Ronald M., and Holmes, Stephen T. – *Profiling Violent Crimes: An Investigative Tool*
10. India-specific criminal case reports and publications by NCRB, BPR&D, etc.

Course Learning Outcome (CLO): Understand fundamental concepts and methodologies of criminal profiling

1. Analyze crime scene behavioral patterns for offender profiling
2. Apply profiling techniques in hypothetical and real crime scenarios
3. Understand the limitations and ethical concerns in profiling practice
4. Appreciate the emerging role of behavioral forensics in modern criminal investigations



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Department of Forensic Science

I Year: I Semester (THEORY)

Crime and Society

Code: BFS 103

L	T	P	C
3	0	0	3

Course Objective: After studying this paper, the students will know:

1. The importance of criminology.
2. The causes of criminal behavior.
3. The significance of criminal profiling to mitigate crime.
4. . The consequences of crime in society.
5. The elements of criminal justice system

UNIT I: Basics of Criminology

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

UNIT II: Crime

Elements, nature, causes and consequences of crime. Deviant behaviour. Hate crimes, organized crimes and public disorder, domestic violence and workplace violence.

UNIT III: 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.

UNIT IV: Recent Advancements in Crimes

Victimology. Juvenile delinquency. Social change and crime. Psychological Disorders and Criminality. Situational crime prevention, Hate crimes, Organized crimes, Situational crime, Economic crime, Sexual Offences, Crime due to intoxication, Cybercrimes, and White collar crimes,

UNIT V: Crime and Social Control Mechanisms

Social Control: Definition and types of social control, Role of family, education, religion, media in social control, Social norms and their impact on crime prevention, Law Enforcement Agencies

Suggested Reading:

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.



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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

Course Learning Outcome (CLO): Understand the relationship between crime and society

1. Explain the various types and causes of crime
2. Analyze the structure and functioning of the criminal justice system in India
3. Evaluate contemporary crime trends and preventive measures
4. Appreciate the role of forensic science in crime prevention and investigation



Mahayogi Gorakhnath University Gorakhpur

Faculty of Health and Life Sciences

Department of Forensic Science

I Year: I Semester (THEORY)

General Chemistry-I

BFS104

Course Objective: After studying this paper, the students will know

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

L	T	P	C
3	0	0	3

UNIT I: Concept of Chemistry

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

UNIT II: Introduction to General and Organic Chemistry and Techniques

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

UNIT III: Introduction of Chemical Components and Physical Chemistry

Heterocyclic Chemistry: Natural products, Petroleum products, insecticides, pesticides etc. Introduction to dyes, Paints, and polymers. Chemical thermodynamics- Gibbs- Helmholtz's energy efficiency, entropy, work function. a) Chemical kinetics -rate, order and molecularity of reaction. Energy of activation, molecular activation

UNIT IV: Introduction to Thermodynamics and Energetics

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

UNIT V: Basics of Inorganic Chemistry:

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

Suggested Reading:



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

Course Learning Outcome (CLO): Upon successful completion of this course, the students will be able to:

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



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Department of Forensic Science

I Year: I Semester (THEORY)

General Biology

BFS105

Course Objective: After studying this paper, the students will know

1. Read, understand and critically interpret the primary biological literature
2. Design, conduct analyse and communicate biological research
3. Will be able to explain the organic evolution and its principles and mechanism.

L	T	P	C
3	0	0	3

UNIT I: Introduction to Biology & Cellular Basis of Life

Characteristics of life; levels of biological organization, Prokaryotic vs. eukaryotic cells; cell organelles and functions, Cell division: Mitosis and meiosis (forensic significance in DNA inheritance), Biomolecules: Structure/function of carbohydrates, lipids, proteins, nucleic acids, NA vs. RNA; forensic implications of nucleic acid stability, Cellular Metabolism: Enzymes (kinetics, inhibition); Role of enzymes in decomposition (forensic entomology/pathology)

UNIT II: Genetics and Molecular Biology

Classical Genetics: Mendelian inheritance; blood group genetics (ABO, Rh), Pedigree analysis (paternity/disputed inheritance cases). Molecular Genetics: DNA replication, transcription, translation, Mutations (types, causes); PCR, STR analysis, sequencing (Sanger, NGS) Applications: DNA profiling, CODIS-DNA databases, mass disaster identification, Population Genetics: Hardy-Weinberg equilibrium; allele frequencies (ethnicity estimation).

UNIT III: Plant Biology & Environmental Interactions

Plant Anatomy & Physiology: Tissue systems; root/shoot morphology, Photosynthesis and respiration, Plant Taxonomy: Major plant families, bioindicators of pollution; soil microbial profiling, Decomposition ecology: Plant succession on graves

UNIT IV: Human Anatomy and Physiology

Skeletal & Muscular Systems, Circulatory & Respiratory Systems, Nervous & Endocrine Systems, Integumentary System (Skin Layers, Hair structure)

UNIT V: Microbiology, Immunology, and Disease

Microbial Diversity: Bacteria, viruses, fungi, parasites (morphology, classification). Pathogens in bioterrorism (anthrax, ricin). Immunology: Innate vs. adaptive immunity; antigen-antibody reactions. Serology: ELISA, precipitin tests (species identification). Disease Modes of infection: epidemiology

Suggested Reading:

1. A Dictionary of ecology – Michael Alleby
2. Encyclopedia of evolution – Stanley rice.
3. Desk encyclopedia of microbiology – Moselio
4. Biology: Solomon, Berg & Martin
5. Microbiology: An Introduction- Tortora, Funke & Case
6. Textbook of Medical Physiology- Guyton and Hall



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Course Learning Outcome (CLO): Upon successful completion of this course, the students will be able to:

1. Understand basic biological principles relevant to forensic science.
2. Demonstrate knowledge of human anatomy, physiology, and genetics for forensic identification.
3. Apply knowledge of zoology, entomology, and botany in crime scene analysis.
4. Recognize the forensic significance of microorganisms and environmental evidence.
5. Relate biological concepts to forensic casework.



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I Year: I Semester (THEORY)

Functional English

BFS 106

L	T	P	C
3	0	0	3

Course Objective:

The objective of this course is to initiate the learners into new aspect of English language. They will be acquainted with language and communication, production of speech sounds, articulatory phonetics, communicative and functional grammar.

Unit-I: Communication

Definition, objectives and process of communication. Language as a tool of communication. Various Principles of effective communication. Five functions of language. Types of communication: Features of Formal and Informal communication; Interpersonal communication: Types and Principles. Group and Mass Communication, its types, characteristics and importance.

Unit-II: Articulatory Phonetics-I

Introduction to the organs of speech, Air-stream mechanism, Production of Speech Sounds (Respiration, Phonation, Articulation, Resonance), Introduction to phonetic symbols. Classification and articulatory description of vowels: Cardinal vowel chart, High, Mid, Low Front and Back Vowels; Voice and Voicelessness; Monophthongs and Diphthongs.

Unit-III: Articulatory Phonetics-II

Classification and articulatory description of consonants: Manner and place of articulation. Labialisation, Palatalisation, Nasalisation, Retroflexion. Consonant Clusters.

Unit IV: Communicative English Grammar I

Features of spoken English: Tag Questions, Ellipsis, Coordination and subordination of clauses, Finite clauses, Signposts, Contracted forms. Specific and Generic use of 'the', Generic use of Pronouns (One, you, they).

Unit-V: Communicative English Grammar-II

Emotive emphasis in speech: Interjections, Exclamations, Emphatic negation, Expressing obligation /compulsion, Words describing emotions, Rhetorical Questions.

Suggested Reading:

1. Functional English Grammar: An Introduction for Second Language Teachers by Graham Lock. Cambridge University Press, 1996
2. Professional Communication and Remedial English by Sadhna Gupta, University Science Press. A Communicative Grammar of English by Geoffrey Leech and Jan Svartvik
3. The Structure of Modern English: A Linguistic Introduction, Volume 1, by Laurel J. Brinton
4. A Course in English Phonetics by Tej R Kansakar, Orient Longman, 2001.
5. Functional English for Communication by Ujjwala Kakarla, Tanu Gupta, Leena Pundir, Sage Publications, 2019.

Course Learning Outcome (CLO): Upon successful completion of this course, the students will be able to:



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1. Communicate effectively in both written and spoken English in academic and scientific contexts.
2. Develop confidence in delivering scientific presentations and participating in discussions.
3. Write scientific reports, summaries, and formal letters
4. Read and interpret scientific literature effectively
5. Enhance employability skills like CV writing, email etiquette, and interview skills



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Department of Forensic Science

I Year: I Semester (THEORY)

First Aid and Health

BFS 107

L	T	P	C
2	0	0	2

Course Objective:

Course Objectives: The objectives of the course are as follows:

1. To give immediate care.
2. To protect the casualty from further harm.
3. To relieve pain.
4. To promote recovery
5. The recovery is promoted as the heart rate goes down, which in turn prevents blood loss from the victim's body.

UNIT I- Basic First Aid and Technique

Aims of first aid & First aid and the law, Dealing with an emergency, Resuscitation (basic CPR), Recovery position, Initial top to toe assessment, Hand washing and Hygiene, Types and content of a first aid kit, Dressings and Bandages, Fast evacuation techniques (single rescuer), Transport techniques

UNIT II: First aid related with the respiratory system, Heart, Blood and Circulation and Wounds and Injuries

Basics of respiration, No breathing or difficult breathing, Drowning, Choking, Strangulation and hanging, Swelling within the throat, Suffocation by smoke or gases and Asthma, Basics of The heart and the blood circulation, Chest discomfort, bleeding, Type of wounds, Small cuts and abrasions, Head, Chest, Abdominal injuries, Amputation, Crush injuries, Shock.

UNIT III: First aid related with; Nervous system and Unconsciousness, Gastrointestinal Tract, Skin, Burns

Basics of the nervous system, Unconsciousness, Stroke, Fits – convulsions – seizures, Epilepsy, Basics of the gastrointestinal system, Diarrhea, Food poisoning, Basics of the skin, Burn wounds, Dry burns and scalds (burns from fire, heat and steam), Electrical and Chemical burns, Sun burns, heat exhaustion and heatstroke, Frost bites (cold burns), Prevention of burns, Fever and Hypothermia, Animal bites, Road and traffic accidents.

UNIT IV: Basic Sex Education

Overview, ground rules, and a pre-test, Basics of Urinary system and Reproductive system, Male puberty — physical and emotional changes, Female puberty — physical and emotional changes, Male-female similarities and differences, Sexual intercourse, pregnancy, and childbirth, Facts, attitudes, and myths about LGBTQ+ issues and identities, Birth control and abortion, sexual harassment, sexual abuse, and rape, Prevention of sexually transmitted diseases.

UNIT V: Mental Health and Psychological First Aid

Mental Health First Aid, Mental Health Problems in India, The Mental Health First Aid Action Plan, Understanding Depression and Anxiety Disorders, Crisis First Aid for Suicidal Behaviour & Depressive symptoms, Non-Suicidal Self-Injury, Non-crisis First Aid for Depression and Anxiety, Crisis First Aid for Panic Attacks, Traumatic events, Understanding Disorders in Which Psychosis may Occur, Crisis First Aid for Acute



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Department of Forensic Science

Psychosis, Understanding Substance Use Disorder, Crisis First Aid for Overdose, Withdrawal, Using Mental Health First Aid

SUGGESTED READING:

1. Dr. Gauri Goyal, Dr. Kumkum Rajput & Dr. Manjul Mungali. 2020. First Aid and Health, ISBN 978-93-92208-19-5
2. Indian First Aid Manual-<https://www.indianredcross.org/publications/FA-manual.pdf>
3. Red Cross First Aid/CPR/AED Instructor Manual

Course Learning Outcome (CLO): Upon successful completion of this course the student should be able to:

1. Learn the skill needed to assess the ill or injured person and to provide CPR to infants, children and adults.
2. Learn the Basic sex education help young people navigate thorny questions responsibly and with confidence.
3. Learn the Basic sex education help youth to understand Sex is normal. It's a deep, powerful instinct at the core of our survival as a species. Sexual desire is a healthy drive.
4. Learn the skill to identify Mental Health status and Psychological First Aid



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Department of Forensic Science

I Year: I Semester (PRACTICAL)

Forensic Science Lab

BFS151

L	T	P	C
0	0	2	1

Course objective: The objectives of the lab course are as follows:

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

PRACTICALS

1. To study the history of crime cases from a forensic science perspective.
2. To cite examples of crime cases in which apprehensions arose because of Daubert standards.
3. To review the sections of forensic science at INTERPOL and compare them with those in Central Forensic Science Laboratories in India. Include suggestions for improvements if any.
4. To study the annual reports of the National Crime Records Bureau and depict the data on different types of crime cases by way of smart art/ templates
5. To write reports on different types of crime cases.
6. To review how the Central Fingerprint Bureau, New Delhi, coordinates the working of State Fingerprint Bureaus.
7. To examine the hierarchical set up of different forensic science establishments and suggest improvements
8. To examine the list of projects undertaken by the Bureau of Police Research and Development and suggest the thrust areas of research in Police Science.
9. To compare and contrast the role of a Police Academy and a Police Training School.
10. To compare the code of conduct prescribed by different establishments for forensic scientists.

Suggested Reading:

1. DFS Manuals of Forensic Science

Course Learning Outcome (CLO):

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



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I Year: I Semester (PRACTICAL)

Crime Profiling Lab

BFS152

L	T	P	C
0	0	2	1

Course objective: The objectives of the lab course are as follows:

1. Analyze crime scenes to infer offender behavior and motivations.
2. Apply geographic profiling techniques to predict offender location.
3. Construct preliminary criminal profiles using behavioral evidence.
4. Evaluate victimology to assess risk and offender-victim dynamics.
5. Integrate forensic data (DNA, ballistics) with behavioral analysis.
6. Critically assess the limitations and ethical implications of profiling.

PRACTICALS

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

Suggested Reading:

1. Douglas, J. E., & Olshaker, M. (1995). Mindhunter: Inside the FBI's Elite Serial Crime Unit.
2. Turvey, B. E. (2011). Criminal Profiling: An Introduction to Behavioral Evidence Analysis.
3. Geberth, V. J. (2006). Practical Homicide Investigation: Tactics, Procedures, and Forensic Techniques.

Course Learning Outcome (CLO):

1. **Analyze crime scenes** to distinguish between *modus operandi (MO)* and *signature behaviors* using physical evidence. (Analyze)
2. **Evaluate victimology reports** to assess victim risk levels and offender selection patterns.
3. **Construct criminal profiles** (demographics, psychological traits) by integrating behavioral evidence with forensic data (DNA/digital traces). (Create)
4. **Link serial crimes** by identifying behavioral consistency and signature aspects across case studies.



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5. **Assess credibility of suspect statements** using SCAN or linguistic deception detection methods.
6. **Correlate digital footprints** (social media/dark web) with offender behavior in cybercrime scenarios.
7. **Critique ethical limitations** of profiling, including cognitive biases and risks of wrongful



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I Year: I Semester (PRACTICAL)
General Chemistry-I Lab
BFS153

L	T	P	C
0	0	2	1

Course Objectives: By the end of this course, students will be able to:

1. Understand and apply basic concepts of general, organic, and physical chemistry in a laboratory setting.
2. Develop skills in chemical handling, preparation, and performing quantitative and qualitative experiments.
3. Gain hands-on experience in classical techniques like volumetric and gravimetric analysis.
4. Learn basic organic functional group identification and separation techniques like chromatography.
5. Understand the kinetics and thermodynamics of chemical reactions experimentally.

PRACTICALS

1. Determination of Empirical and Molecular Formula (e.g., using Magnesium oxide experiment)
2. Acid-Base Titration: Standardization of NaOH using oxalic acid
3. Preparation of standard solution and determination of molarity/molar mass.
4. Paper Chromatography: Separation of Amino Acids or Pigments.
5. Thin Layer Chromatography (TLC): Separation of organic dyes or leaf pigments.
6. Qualitative analysis of functional groups: Test for Alcohol, Aldehyde, Ketone, and Carboxylic acids
7. Effect of Temperature on Reaction Rate (Arrhenius Plot)
8. Determination of Enthalpy Change for a Neutralization Reaction
9. Study of Periodic Properties: Ionization potential / Reactivity of Alkali Metals
10. Identification of S-block and P-block elements by Flame Test and other qualitative tests

Course Learning Outcomes (CLOs):

1. Demonstrate accurate use of basic laboratory equipment and glassware for a chemical experiment.
2. Calculate molar concentrations, empirical and molecular formulas from experimental data.
3. Perform acid-base titrations and determine percentage composition and molecular weights.
4. Identify basic organic functional groups and compounds using chemical tests and separation techniques.
5. Analyse reaction kinetics and thermodynamic parameters of simple chemical reactions.
6. Interpret chromatographic separation patterns for chemical components.



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B. Sc. (Honors with Research) Forensic Science
Study Evaluation Scheme (As per NEP2020)
Effective from the session 2025-26

I Year: II Semester

S No	Course Code	Course	L	T	P	Evaluation Scheme		Total	Credits	Course Type
						CIE	ESE			
Theory										
1	BFS201	Criminal Law and Criminology	3	0	0	25	75	100	3	Major
2	BFS202	Fingerprint Science	3	0	0	25	75	100	3	Major
3	BFS203	Questioned Documents	3	0	0	25	75	100	3	Major
4	BFS204	General Chemistry-II	3	0	0	25	75	100	3	Minor
5	BFS205	General Physics-I	3	0	0	25	75	100	3	MD
6	BFS206	Artificial Intelligence Foundation and Applications	3	0	0	25	75	100	3	SEC
7	BFS207	Food, Nutrition, and Hygiene	2	0	0	25	75	100	2	VAC
Practical										
8	BFS251	Criminology & Fingerprint Science Lab	0	0	2	25	75	100	1	Major
9	BFS252	General Chemistry-II Lab	0	0	2	25	75	100	1	Minor
10	BFS253	General Physics-I Lab	0	0	2	25	75	100	1	Minor
Total			20	0	6	225	675	1000	23	

Certificate Course in Forensic Science*

Evaluation Scheme, promotion scheme, grading system, and CGPA calculation adopted from CCFUP, by UGC 2022.

L	Lecture
T	Tutorial
P	Practical
CIE	Continuous Internal Evaluation
ESE	End Semester Examination
GE	Generic Elective
AEC	Ability Enhancement Course
SEC	Skill Enhancement Courses
DSE	Discipline Specific Elective
MD	Multidisciplinary
VAC	Value-Added Courses common for all UG

*** UG Certificate:** Students who opt to exit after completion of the first year and have secured 40 credits will be awarded a UG certificate if, in addition, they complete one vocational course of 4 credits during the summer vacation of the first year. These students are allowed to re-enter the degree program within three years and complete the degree program within the stipulated maximum period of seven years.



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I Year: II Semester (THEORY) Criminal Law and Criminology Code: BFS201

L	T	P	C
3	0	0	3

Course Objectives: To Learn & Understand:

1. Elements of the Criminal Procedure Code related to forensic science.
2. Acts and provisions of the Constitution of India related to forensic science.
3. Acts governing socio-economic crimes.
4. Acts governing environmental crimes

UNIT -I: 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- II: Crime and Criminology

Classification of cases, Types of offences, Essential elements of criminal law, Constitution and hierarchy of criminal courts, Legal procedure about expert witness testimony, Expert witness.

UNIT III:

Law to Combat Crime: Classification – civil, criminal cases. Essential elements of criminal law. Constitution and hierarchy of criminal courts. Criminal Procedure Code. Cognizable and non-cognizable offences. Bailable and non-bailable offences. Sentences which the court of Chief Judicial Magistrate may pass. Summary trials – Section 260(2). Judgements in abridged forms – Section 355.

UNIT IV:

Indian Penal Code pertaining to offences against persons – Sections 121A, 299, 300, 302, 304A, 304B, 307, 309, 319, 320, 324, 326, 351, 354, 359, 362. Sections 375 & 377 and their amendments. Indian Penal Code pertaining to offences against property Sections – 378, 383, 390, 391, 405, 415, 420, 441, 463, 489A, 497, 499, 503, 511. Indian Evidence Act – Evidence and rules of relevancy in brief. Expert witness. Cross examination and re-examination of witnesses. Sections 32, 45, 46, 47, 57, 58, 60, 73, 135, 136, 137, 138, 141. Section 293 in the code of criminal procedure.

UNIT V: Acts About 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).



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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

Course Learning Outcomes (CLOs):

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



Mahayogi Gorakhnath University Gorakhpur

Faculty of Health and Life Sciences

Department of Forensic Science

I Year: II Semester (THEORY)

Fingerprint Science

BFS202

L	T	P	C
3	0	0	3

Course Objectives: To Learn & Understand:

1. The fundamental principles on which the science of fingerprinting is based.
2. Fingerprints are the most infallible means of identification.
3. The world's first fingerprint bureau was established in India.
4. The method of classifying criminal record by fingerprints was worked out in India, and by Indians.
5. The physical and chemical techniques of developing fingerprints on crime scene evidence.
6. The significance of foot, palm, ear, and lip prints.

UNIT 1: Basics of Fingerprinting

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

UNIT II: Development of Fingerprints

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

UNIT III: Other Impressions

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

UNIT IV: Recording and Examination of Fingerprints

Recording and Examination of Fingerprints Ridge Counting and Tracing, Filling and Searching. Method for Making an Inked Specimen of Fingerprint. Taking of Fingerprint from Living and Dead Person. Comparison Protocols: Class and Individual Characteristics (Galton's Details), Different Ridge Characteristics

UNIT V: Latent Fingerprints and Presentation of Fingerprint Evidence in the Court

Latent Fingerprints and Chance Fingerprints in Criminal Investigation, Investigating Latent Fingerprints, Various Methods of Development of Fingerprints: Physical (Black and Grey, Fluorescent and Magnetic Powder Method) and Chemical Methods, Fuming Methods, Laser Method, Lifting of Latent Fingerprints. Photography of Latent Traces. Fingerprint as Forensic Evidence, Presentation of Fingerprint Evidence and Testimony in Court.



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Suggested Readings:

1. Bridges, B.C., Vollmar, A. and Munir, M. Criminal Investigation, Practical Fingerprinting, Thumb Impressions, Handwriting, Expert Testimony Opinion Evidence. University Book Agency: Allahabad;(2000).
2. James, S.H. and Nordby, J.J. Forensic Science-An Introduction to Scientific and Investigation Techniques 4 th ed. CRC Press: London;(2015).
3. Nanda, B.B. and Tewari, R.K. Forensic Science in India-A Vision for the Twenty-First Century. Select Publishers: New Delhi;(2001).
4. Saferstein, R. Criminalistics, An Introduction to Forensic Science 6th ed. PrenticeHall: New Jersey;(1998).
5. Sharma, B.R. Forensic Science in Criminal Investigation and Trials 3rd ed. Universal Law Publishing: New Delhi;(2001).
6. Chatterjee, S.K. Speculation in Fingerprint Identification. Calcutta; (1981).

Course Outcome:

1. To explain the history and development of fingerprints with their importance as evidence.
2. To explain the formation of friction ridges, basic fingerprint pattern types, and their interpretation. Different individual characteristics of ridges.
3. To explain the ridge counting and tracing. Method for making an inked specimen of a fingerprint.
4. To describe the classification of fingerprints -Henry system, single digit classification and the function of the Fingerprint Bureau.
5. To explain the latent fingerprints and chance fingerprints in criminal investigation, and describe the various methods of developing fingerprints.



Mahayogi Gorakhnath University Gorakhpur
Faculty of Health and Life Sciences
Department of Forensic Science

I Year: II Semester (THEORY)
Questioned Documents
BFS203

L	T	P	C
3	0	0	3

Course Objectives: To Learn & Understand:

1. The importance of examining questioned documents in crime cases.
2. The tools required for the examination of questioned documents.
3. The significance of comparing handwriting samples.
4. The importance of detecting fraud and forgeries by analysing questioned documents.

UNIT 1: Nature and Scope of Questioned Documents

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

UNIT 1I: Comparison of Documents

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

UNIT 1II: Forgeries

Alterations in documents, including erasures, additions, overwriting, and obliterations. Indented and invisible writings, Charred documents, Disguised writing and anonymous letters, Signature identification, variations in signature and factors influencing them, Examination of signatures for forgeries.

UNIT 1V: Counterfeiting and its detection

General idea on manufacture of genuine Indian Currency Notes and coins, Examination of counterfeit Indian currency notes, and Indian Coins, passports, visas, rubber stamps, seals, and stamp papers, Recording, documentation, and courtroom presentation of Questioned Document, Evidence by photography and juxtaposition charts.

UNIT V: Electronic Documents

Concept, Scope and reference to Indian laws regarding their admissibility, Forensic Speaker identification, Scope, Audiogram and speech characteristics, Video analysis, scope and detection of tampered videos, Morphing and its detection, Steganography and its detection, Its use as investigative lead and forensic evidence in courts.

Suggested Readings:

1. O. Hilton, Scientific Examination of Questioned Documents, CRC Press, Boca Raton (1982).



Mahayogi Gorakhnath University Gorakhpur

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Department of Forensic Science

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).

Course Outcomes: At the end of the course, students should be able to

1. Demonstrate the acquisition of comprehensive knowledge and skills about the examination of questioned documents in a crime scene
2. Demonstrate the acquisition of comprehensive knowledge about individualization development in handwriting.
3. Demonstrate the skills of identification of Genuine Indian currency notes
4. Demonstrate the skills of evidence presentation and analysis of electronic documents.



Mahayogi Gorakhnath University Gorakhpur

Faculty of Health and Life Sciences

Department of Forensic Science

I Year: II Semester (THEORY)

General Chemistry-II

BFS204

Course Objectives: To Learn & Understand:

1. Comparing and contrasting kinetic and potential energy
2. Significance of the no., position in nuclear magnetic resonance spectra.
3. Predict the direction and relative magnitudes of the dipole moments of molecules.
4. To evaluate and identify the heat capacity, enthalpy, melting point and mechanisms of preparation of several compounds.

L	T	P	C
3	0	0	3

UNIT-I: Thermochemistry

Important principles and definitions of thermochemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature – Kirchhoff's equation.

UNIT-II: Chemical Equilibrium

Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium. Distinction between Q_G and Q_{G° , Le Chatelier's principle, Relationships between K_p , K_c and K_x for reactions involving ideal gases.

UNIT-III: Transition Elements (3rd series)

General group trends with special reference to electronic configuration, variable valency, colour, magnetic and catalytic properties, Lanthanides and actinides: Electronic configurations, Oxidation states, colour, magnetic properties

UNIT-IV: Aromatic Hydrocarbon

Preparation (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene, Sulphonic acid. Reactions: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation. Friedel-Craft's reaction (alkylation and acylation). (Upto 4 carbons on benzene).

UNIT-V: Alkyl Halides and Aryl Halides

Alkyl Halides: (Upto 5 Carbons) Types of Nucleophilic Substitution (SN_2 , SN_1 and SN_i) reactions, Williamson's ether synthesis: Elimination vs substitution, Aryl Halides: *Preparation*: (Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer & Gattermann reactions, Reactivity and Relative strength of C-Halogen bond in alkyl, allyl, benzyl, vinyl and aryl halides.

Suggested Readings:

1. Arun Bahl and B. S. Bahl: Advanced Organic Chemistry, S. Chand
2. Vogel's Qualitative Inorganic Analysis, revised, Svehla, Orient Longman.
3. Vogel's Textbook of quantitative Inorganic Analysis (revised), J. Bassett, R.C. Denney, G.H. Heffery and J Mendham, ELBS.
4. Standard Methods of Chemical Analysis, W.W. Scott, The Technical Press.
5. Experimental inorganic Chemistry, W.G. Palmer, Cambridge.



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Course Outcomes:

1. To understand the Important principles and definitions of thermochemistry.
2. To gain knowledge of chemical equilibrium.
3. To understand the meaning of the term transition element and gain an appreciation of the characteristic properties of transition elements.
4. Elaborate on the type of Nucleophilic Substitution.
5. To understand the reactivity of various alkyl halide.
6. To analyze bond energy, bond dissociation energy, and resonance energy from thermochemical data.



Mahayogi Gorakhnath University Gorakhpur

Faculty of Health and Life Sciences

Department of Forensic Science

I Year: II Semester (THEORY)

General Physics-I

BFS205

L	T	P	C
3	0	0	3

Course Objectives (CO):

1. To provide fundamental understanding of measurement systems and error analysis in forensic experiments.
2. To explain physical properties of matter relevant in forensic investigations.
3. To introduce sound and ultrasonic techniques useful for forensic material testing.
4. To impart knowledge of basic nuclear physics and its forensic applications.
5. To build a foundation in basic electronics and instrumentation used in forensic laboratories.

UNIT I: Physical Measurements and Error Analysis

Units and Dimensions: SI Units, derived units, dimensional analysis, Measurement errors: Types (systematic and random), accuracy, precision, significant figures, Data representation: Graphical representation of data, linear fitting, least squares method, Uncertainty calculation and propagation of errors in experimental physics.

Unit II: Properties of Matter

Elasticity: Stress, strain, Hooke's Law, elastic constants, Surface Tension: Molecular theory, capillary rise method, applications in forensic sample handling, Viscosity: Coefficient of viscosity, Stoke's law, terminal velocity, viscosity measurement by falling sphere method, Fluid Dynamics: Bernoulli's theorem and its forensic applications.

Unit III: Sound and Ultrasonics

Sound waves: Speed of sound in different media, intensity, loudness, and Doppler shift in sound (excluding optical Doppler, already covered), Ultrasonics: Production and detection of ultrasonic waves, Applications of Ultrasonics: Forensic and industrial applications

Unit IV: Nuclear Physics

Structure of nucleus: Nuclear radius, nuclear forces, binding energy, Nuclear Reactions: Fission, Fusion (basic concept only), Nuclear Detectors: GM Counter, Scintillation Counter, Solid-State detectors (Elementary idea), Applications of nuclear physics in forensic science (e.g., radioactive dating, nuclear forensic techniques).

Unit V: Basic Concepts of Electronics and Instrumentation

Basic concepts of conductors, insulators, and semiconductors (beyond junctions already covered), Basic logic gates (AND, OR, NOT, NAND, NOR) and their truth tables. Operational Amplifiers (OPAMP) – Concept and applications in signal amplification (basic level only), Transducers: Types and working principle (Temperature, Pressure, Sound, Light-based sensors), Basics of Digital to Analog (D/A) and Analog to Digital (A/D) conversion.

Suggested Readings

1. D. S. Mathur – Elements of Properties of Matter, S. Chand Publication.
2. Halliday, Resnick, Walker – Fundamentals of Physics, Wiley.
3. H. C. Verma – Concepts of Physics (Vol I & II), Bharati Bhawan.
4. Ghatak, A. K. – Optics, Tata McGraw Hill.
5. V.K. Mehta, Rohit Mehta – Principles of Electronics, S. Chand Publishing.
6. Tayal D.C. – Nuclear Physics, Himalaya Publishing House.
7. R.K. Rajput – Basic Electrical and Electronics Engineering, Laxmi Publications



Mahayogi Gorakhnath University Gorakhpur

Faculty of Health and Life Sciences

Department of Forensic Science

I Year: II Semester (THEORY)

Artificial Intelligence Foundation and Applications

BFS206

L	T	P	C
3	0	0	3

Course Objectives:

1. To provide fundamental knowledge of Artificial Intelligence (AI) concepts and techniques.
2. To introduce basic AI algorithms and tools for problem solving.
3. To demonstrate AI applications in forensic science, including crime analysis, image recognition, and evidence evaluation.
4. To build analytical thinking for decision making using AI tools in forensic investigations.

Unit I: Introduction to Artificial Intelligence

Definition, History, and Evolution of AI, Basic Concepts: Intelligent agents, Search spaces, Types of AI: Weak AI, Strong AI, Expert Systems, Application areas of AI in various domains

AI relevance in Forensic Science: Overview of use cases (e.g., Crime prediction, Digital forensics)

Unit II: Problem Solving and Search Techniques

Problem Formulation, Uninformed Search Strategies: Breadth First Search, Depth First Search, Informed Search Strategies: Best First Search, Heuristics and Evaluation functions, Application in forensic case solving: Crime Scene Reconstruction Models, Criminal Pattern Analysis

Unit III: Knowledge Representation and Reasoning

Introduction to Knowledge Representation, Propositional Logic and Predicate Logic, Rule-based Systems, Expert Systems, Decision Trees, and their use in investigations

Unit IV: Machine Learning and Pattern Recognition

Introduction to Machine Learning: Supervised and Unsupervised Learning, Basics of Neural Networks and Decision Trees, Classification and Clustering Techniques, Pattern Recognition in Forensic Science, Biometric Identification (Fingerprint, Face, Voice) Crime Trend Analysis, Predictive Policing Models, Introduction to Image and Speech Recognition tools in forensics

Unit V: AI Applications in Forensic Science

AI in Digital Forensics: Cybercrime Detection, Email Fraud Detection, Natural Language Processing (NLP) for Threat Analysis and Document Review, Automated Crime Scene Analysis, AI in Video Surveillance and Object Detection, Ethics and Legal Implications of AI in Forensics, Case Studies of AI Implementation in Forensic Investigations

Suggested Readings:

1. Artificial Intelligence: A Modern Approach – Stuart Russell and Peter Norvig
2. Artificial Intelligence and Legal Analytics – Kevin Ashley
3. Machine Learning for Cybersecurity Cookbook – Emmanuel Tsukerman
4. Artificial Intelligence in Digital Forensics – Mark Reith et al.

Course Outcomes: After completing this course, students will be able to:



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1. Understand core concepts, history, and scope of Artificial Intelligence.
2. Explain fundamental AI algorithms for search, reasoning, and decision making.
3. Apply AI techniques in forensic domains such as pattern recognition, crime prediction, and biometric identification.
4. Explore machine learning and natural language processing applications relevant to forensic science.
5. Analyze real forensic case datasets using AI tools



Mahayogi Gorakhnath University Gorakhpur

Faculty of Health and Life Sciences

Department of Forensic Science

I Year: II Semester (THEORY)

Food, Nutrition, and Hygiene

Code: BFS207

L	T	P	C
2	0	0	2

Course objective: The objectives of the course are as follows:

1. To learn the basic concept of Food and Nutrition
2. To study the nutritive requirement during special conditions like pregnancy and lactation
3. To learn meal planning
4. To learn 100 days Nutrition Concept

UNIT I: Concept of Food and Nutrition

Concept of Food and Nutrition (a) Definition of Food, Nutrients, Nutrition, Health, balanced Diet (b) Types of Nutrition- Optimum Nutrition, under Nutrition, Over Nutrition (c) Meal planning- Concept and factors affecting Meal Planning (d) Food groups and functions of food.

UNIT II: Nutrients: Macro and Micro

Nutrients: Macro and Micro RDA, Sources, Functions, Deficiency and excess of (a) Carbohydrate (b) Fats (c) Protein (d) Minerals Major: Calcium, Phosphorus, Sodium, Potassium Trace: Iron, Iodine, Fluorine, Zinc (e) Vitamins Water soluble vitamins: Vitamin B, C Fat soluble vitamins: Vitamin A, D, E, K (f) Water (g) Dietary Fiber.

UNIT III: 1000 days Nutrition

1000 days Nutrition (a) Concept, Requirement, Factors affecting the growth of child (b) Prenatal Nutrition (0 - 280 days): Additional Nutrients' Requirement and risk factors during pregnancy (c) Breast / Formula Feeding (Birth – 6 months of age) Complementary and Early Diet (6 months – 2 years of age)

UNIT IV: Community Health Concept

Community Health Concept (a) Causes of common diseases prevalent in the society and Nutrition requirements in the following: Diabetes Hypertension (High Blood Pressure) Obesity Constipation Diarrhoea, Typhoid (b) National and International Program and Policies for improving Dietary Nutrition (c) Immunity Boosting Food.

Suggested Readings

1. Singh, Anita, "Food and Nutrition", Star Publication, Agra, India, 2018.
2. 1000Days-Nutrition_Brief_Brain-Think_Babies_FINAL.pdf
3. <https://pediatrics.aappublications.org/content/141/2/e20173716>
4. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5750909/>
5. SheelSharma, Nutrition and Diet Therapy, Peepee Publishers Delhi, 2014, First Edition.

Course Learning Outcome (CLO): Upon successful completion of this course, the student will:

1. Understanding the basic concept of the Food, Nutrition and hygiene
2. To explain nutritive requirement during pregnancy and lactation etc.
3. To prepare meal planning
4. To understand and explain 100 days Nutrition Concept



Mahayogi Gorakhnath University Gorakhpur
Faculty of Health and Life Sciences
Department of Forensic Science

I Year: II Semester (PRACTICAL)
Criminology & Fingerprint Science Lab
BFS251

L	T	P	C
0	0	2	1

Course Objectives:

1. To introduce students to the practical aspects of criminology and criminal behaviour analysis.
2. To train students in the scientific methods of fingerprint detection, development, lifting, and comparison.
3. To familiarize students with the classification and identification techniques used in fingerprint analysis.
4. To develop hands-on skills in crime scene investigation related to fingerprints and criminal profiling.
5. To encourage critical thinking in evaluating criminal behaviour and crime scene evidence.

PRACTICALS

1. Identify friction ridge characteristics; safely collect patent prints.
2. Develop latent prints on non-porous surfaces using powders
3. Develop latent prints using fluorescent powders & visualize under Alternate Light Sources (ALS)
4. Develop latent prints on porous surfaces using ninhydrin
5. Develop latent prints on non-porous surfaces using cyanoacrylate vapor.
6. Develop latent prints on porous surfaces compromised by water/moisture using PD.
7. Classify inked ten-print cards using the Henry System.
8. Apply NCIC classification codes and perform ridge counting/tracing.
9. Perform comparative analysis between known and questioned prints.
10. Process a simulated burglary/theft scene focusing on fingerprint evidence and initial M.O. assessment.

Course Outcomes: After successful completion of this course, students will be able to

1. Demonstrate an understanding of basic criminological concepts and their practical application.
2. Apply scientific techniques for developing, lifting, and preserving fingerprint evidence.
3. Classify and compare fingerprint patterns using standard classification systems.
4. Identify individual characteristics (minutiae) in fingerprints for personal identification.
5. Analyze a crime scene for fingerprint evidence and reconstruct the sequence of events.
6. Prepare detailed forensic reports based on fingerprint analysis and criminal profiling.



Mahayogi Gorakhnath University Gorakhpur

Faculty of Health and Life Sciences

Department of Forensic Science

I Year: II Semester (PRACTICAL)

General Chemistry- II Lab

BFS252

L	T	P	C
0	0	2	1

Course Objectives:

After the completion of this course students will be able to evaluate

1. To develop the knowledge of determination of heat capacity.
2. Use to estimation of magnesium and zinc by titration using EDTA.
3. To have an overview preparation and mechanism of various reactions.

PRACTICALS

1. Determination of heat capacity of calorimeter for different volumes.
2. To determine the strength of strong acid and weak acid conductometrically by titrating against standard NaOH solution.
3. Study of the variation of mutual solubility temperature with concentration for the phenol-water system and determination of the critical solubility temperature (CST).
4. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
5. Preparations: Mechanism of various reactions involved to be discussed.
6. Recrystallisation, determination of melting point and calculation of quantitative yields to be done.
7. Bromination of Phenol/Aniline
8. Estimation of Zn^{2+} by complexometric titrations using EDTA.
9. Estimation of Mg^{2+} by complexometric titrations using EDTA.
10. Estimation of total hardness of a given sample of water by complexometric titration.

Suggested Reading:

1. B.D Khosla- Chemistry Practical book
2. Ahluwalia- Chemistry Practical Book

Course Outcomes:

1. To evaluate the heat capacity of the calorimeter for different volumes.
2. To identify the melting point of the bromination of phenol/ aniline.
3. Understand the preparation and mechanism of various reactions.
4. Determine the enthalpy of neutralization of hydrochloric acid with sodium hydroxide.
5. To understand how to calculate any mixture by titration
6. Estimate the hardness of the water sample



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Faculty of Health and Life Sciences

Department of Forensic Science

I Year: II Semester (PRACTICAL)

General Physics- I Lab

BFS253

L	T	P	C
0	0	2	1

Course Objectives:

1. Understand the basic principles of classical mechanics, thermodynamics, electromagnetism, waves, optics, and atomic physics through experiments.
2. Develop experimental skills to measure physical quantities like time, mass, force, temperature, current, voltage, and resistance with accuracy.
3. Familiarize themselves with standard laboratory instruments and their operating principles.

PRACTICALS:

1. Determination of Acceleration due to Gravity using a Simple Pendulum
2. Determination of Moment of Inertia of Flywheel
3. Verification of Newton's Second Law using Atwood's Machine
4. Study of Elastic Properties: Young's Modulus by Searle's Apparatus
5. Verification of Boyle's Law using a Boyle's Law Apparatus
6. Determination of Thermal Conductivity of a Good Conductor (Searle's Method)
7. Determination of Specific Heat Capacity of a Liquid by Calorimeter
8. Verification of Ohm's Law and Kirchhoff's Laws (DC Circuit)
9. Study of Semiconductor Diode Characteristics (Forward and Reverse Bias)
10. Study of Resonance in LCR Circuit (AC Response)
11. Determination of Wavelength of Light using Diffraction Grating
12. Study of Polarization using Nicol Prism / Polarimeter

Course Outcomes:

After successful completion of this laboratory course, students will be able to:

1. Apply the laws of mechanics and motion by determining quantities like acceleration due to gravity, moment of inertia, and elastic constants.
2. Demonstrate understanding of thermodynamic principles by measuring properties like thermal conductivity, specific heat, and gas laws.
3. Analyze electrical circuits and verify fundamental laws such as Ohm's law, Kirchhoff's laws, and measure resistance using bridges.
4. Handle laboratory instruments effectively, take accurate measurements, and present experimental data with error analysis.
5. Develop scientific communication skills through preparation of laboratory reports with clear interpretation and presentation of results.



Mahayogi Gorakhnath University Gorakhpur
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Department of Forensic Science

B. Sc. (Honors with Research) Forensic Science
Study Evaluation Scheme (As per NEP2020)
Effective from the session 2025-26

II Year: III Semester

S No	Course Code	Course	L	T	P	Evaluation Scheme		Total	Credits	Course Type
						CIE	ESE			
Theory										
1	BFS301	Analytical Techniques in Forensic Science	3	0	0	25	75	100	3	Major
2	BFS302	Forensic Psychology	3	0	0	25	75	100	3	Major
3	BFS303	Forensic Chemistry-I	3	0	0	25	75	100	3	Minor
4	BFS304	General Physics-II	3	0	0	25	75	100	3	MD
5	BFS305	Ethics in Forensic Science	3	0	0	25	75	100	3	Major
6	BFS306	Constitution of India	3	0	0	25	75	100	3	Minor
7	BFS307	Technical Writing and Presentation Skills	2	0	0	25	75	100	2	SEC
Practical										
8	BFS351	Forensic Psychology Lab	0	0	2	25	75	100	1	Major
9	BFS352	Forensic Chemistry-I Lab	0	0	2	25	75	100	1	Minor
10	BFS353	General Physics-II Lab	0	0	2	25	75	100	1	Major
Total			20		6	250	750	1000	23	

Evaluation Scheme, promotion scheme, grading system, and CGPA calculation adopted from CCFUP, by UGC 2022.

L	Lecture
T	Tutorial
P	Practical
CIE	Continuous Internal Evaluation
ESE	End Semester Examination
GE	Generic Elective
AEC	Ability Enhancement Course
SEC	Skill Enhancement Courses
DSE	Discipline Specific Elective
MD	Multidisciplinary
VAC	Value-added courses common for all UG



Mahayogi Gorakhnath University Gorakhpur
Faculty of Health and Life Sciences
Department of Forensic Science

II Year: III Semester (THEORY)
Analytical Techniques in Forensic Science
Code: BFS301

L	T	P	C
3	0	0	3

Course Objectives:

1. To introduce fundamental principles of analytical techniques used in forensic investigations.
2. To familiarize students with instrumental methods for chemical and biological forensic analysis.
3. To develop a conceptual understanding of spectroscopic, chromatographic, and microscopic techniques.
4. To enable students to interpret analytical data in forensic contexts.
5. To impart knowledge of quality control and validation techniques in forensic analysis.

Unit I: Introduction to Analytical Techniques in Forensic Science

Definition and scope of analytical techniques in forensic science, Classification of analytical methods: qualitative vs quantitative, Sampling techniques and sample preparation for forensic analysis, Importance of method validation and quality assurance in forensic laboratories.

Unit II: Spectroscopic Techniques

Basic principle and instrumentation of UV-Visible spectroscopy, Infrared (IR) spectroscopy: Principle, applications in forensic sample identification, Atomic Absorption Spectroscopy (AAS): Principle and forensic applications, Introduction to Mass Spectrometry (MS).

Unit III: Chromatographic Techniques

General principle of chromatography. Thin Layer Chromatography (TLC): Principle, procedure, and forensic applications, Gas Chromatography (GC): Instrumentation, detectors (FID, ECD), and forensic applications, High Performance Liquid Chromatography (HPLC): Principle and forensic applications.

Unit IV: Microscopic Techniques

Light microscopy: Types and forensic applications, Polarized light microscopy, Comparison microscopy: Applications in tool marks, hair, fiber, and firearm analysis, Scanning Electron Microscopy (SEM): Principle and applications in forensic science.

Unit V: Electrophoresis and Other Modern Techniques

Principles and types of electrophoresis: Paper, gel, and capillary electrophoresis, DNA profiling using electrophoresis, X-ray Diffraction (XRD): Principle and forensic applications, Introduction to hyphenated techniques: GC-MS, LC-MS, and their forensic significance.

Suggested Readings:



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1. Skoog, D. A., West, D. M., Holler, F. J., & Crouch, S. R. Fundamentals of Analytical Chemistry, Cengage Learning.
2. Grob, R. L., & Barry, E. F. Modern Practice of Gas Chromatography, Wiley.
3. Saferstein, R. Criminalistics: An Introduction to Forensic Science, Pearson Education.
4. Willard, H. H., Merritt, L. L., Dean, J. A., & Settle, F. A. Instrumental Methods of Analysis, CBS Publishers.
5. Jain, R. K. Introduction to Analytical Chemistry, S. Chand Publishing.
6. James, S. H., & Nordby, J. J. Forensic Science: An Introduction to Scientific and Investigative Techniques, CRC Press

Course Learning Outcomes (CLO):

1. After successful completion of the course, students will be able to:
2. Explain the basic principles of common analytical techniques used in forensic science.
3. Demonstrate an understanding of sample preparation and analytical protocols for forensic samples.
4. Describe the working principles and forensic applications of spectroscopy, chromatography, and microscopy techniques.
5. Interpret analytical data for forensic evidence evaluation.
6. Apply appropriate analytical techniques for qualitative and quantitative forensic analysis.



Mahayogi Gorakhnath University Gorakhpur

Faculty of Health and Life Sciences

Department of Forensic Science

II Year: III Semester (THEORY)

Forensic Psychology

Code: BFS302

L	T	P	C
3	0	0	3

Course Objectives: After studying this paper, the students will know –

1. The overview of forensic psychology and its applications.
2. The legal aspects of forensic psychology.
3. The significance of criminal profiling.
4. The importance of psychological assessment in gauging criminal behaviour.

Unit I: Basics of Forensic Psychology I

Definition and fundamental concepts, Forensic psychiatry, Psychology and law. Ethical issues in forensic psychology. Mental disorders and forensic psychology. Assessment of mental competency. Mental disorders and forensic psychology. Psychology in the courtroom, with special reference to Section 84 IPC

UNIT II: Psychology and Criminal Behaviour

Psychopathology and personality disorder, psychological assessment and its importance. Serial murderers. Psychology of terrorism, biological factors, and crime – social learning theories, psycho-social factors, and abuse.

Unit II: 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 III: 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 IV: 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).



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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).

Course Outcomes: Students will be able to

1. Describe key concepts, principles and ethical issues in forensic psychology.
2. Understand the psychology of evidence.
3. Apply Psychological assessment and criminal profiling.
4. Analyze the theories of Juvenile delinquency.
5. Evaluate the deception using polygraphy and narcoanalysis
6. Build the biological and social factors to assess the criminal psychology



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Department of Forensic Science

II Year: III Semester (THEORY)

Forensic Chemistry-I

Code: BFS303

L	T	P	C
3	0	0	3

Course Objectives:

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

UNIT I: Introduction to Forensic Chemistry

Definition, need and scope of forensic chemistry, various types of evidences and cases encountered. Alcohol introduction, different types of alcohol and analysis, country-made liquor, clandestine laboratories, trap cases

UNIT II: Petroleum and Petroleum Products

Distillation and fractionation of petroleum. Commercial uses of different petroleum fractions. Analysis of petroleum products. Analysis of traces of petroleum products in forensic exhibits. Comparison of petroleum products. Adulteration of petroleum products.

UNIT III: Explosives

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

UNIT IV: Cases Involving Arson

Chemistry of fire: Fire triangle and tetrahedron. Conditions for fire. Fire scene patterns. Location of point of ignition. Collection and preservation of arson evidence. Analysis of fire debris. Analysis of ignitable liquid residue. Post-flashover burning. Scientific investigation evaluation of clue materials. Information from smoke staining

UNIT V: Drugs

Introduction and classification of Drugs of Abuse (Narcotics, Stimulants, Depressants and Hallucinogens), Analysis of Barbiturates, Chloral hydrate and tranquilizers. Examination of Heroin, Cocaine, LSD, Amphetamine, Benzodiazepines.

Suggested Readings

1. Lundquist, F. and Curry, A.S. Methods of Forensic Science. Inderscience Publisher: California; (1963).



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2. Sharma, B.R. Forensic Science in Criminal Investigation & Trials 6th ed. Lexis Nexis: India; (2019).
3. Brown, W. Drinking, Drugs & Driving Drunk: How Different Drugs Affect the Driving Experience 2nd ed. William Gladden Foundation Press: (2011).
4. Crown, D.A. The Forensic Examination of Paints and Pigments. Thomas: (1968).
5. Lappalainen, J. and Pertulla, P. Accident Investigation Techniques. Oshowiki: (2022).
6. Moenssens, A.A. and Inbaw, F.E. Scientific Evidence in Criminal Cases. Foundation Pr: (1986).
7. Winger, G., Woods, J.H. and Hofmann, F.G. A Handbook on Drug and Alcohol Abuse 4th ed. Oxford University Press: London; (2004).
8. Maehly, A. and Stromberg, L. Chemical Criminalistics. Springer: (1981).
9. Cunliffe, F. Criminalistics and Scientific Investigation (Prentice-Hall series in criminal justice). Prentice Hall: (1980).
10. Clarke, E.G.C. and Moffat, A.C. Clarke's Isolation and Identification of Drugs: In Pharmaceuticals, Body Fluids and Post Mortem Material. Pharmaceutical Press: (1986).

Course Outcome:

1. Will be able to describe explosives and their investigation.
2. Learn about the petroleum products and their analysis.
3. To learn types of alcoholic beverages.
4. Analyze the food additives and food adulterants.
5. Identify the drugs by chemical analysis.



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Faculty of Health and Life Sciences

Department of Forensic Science

II Year: III Semester (THEORY)

General Physics -II

Code: BFS304

L	T	P	C
3	0	0	3

Course Objectives:

1. Perform precise physical measurements and calculate experimental errors.
2. Explain the mechanical and fluid properties of matter relevant to forensic cases.
3. Understand and apply ultrasonic and sound-based methods in forensic testing.
4. Describe fundamental nuclear processes and their forensic applications.
5. Demonstrate basic knowledge of electronics and instrumentation techniques used in forensic laboratories.

UNIT I: Mechanics

Mechanics: Force, conservative and non-conservative force, rotational motion of inertia, expression of M.I. of regular shaped bodies. Kepler's law. Acceleration due to gravity. Simple Harmonic motion and compound pendulum. Newton's law of motion.

UNIT II: Thermal Physics and Thermodynamics

Concept of temperature, ideal gas equation and its law. Vander Waal's equation, reversible and irreversible process, Zeroth law, first, second and third law of thermodynamics. Carnot's cycle.

UNIT III: Electromagnetism

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

UNIT IV: Waves and Oscillations

Resonance and its application, Doppler Effect, Photo electric effect, Electron microscope. Optics: Combination of lens and prism, direct vision spectroscope. Diffraction –the phenomenon, diffraction at a straight edge, slit and wire, Resolving power of a telescope an eye, wave front, polarization of light and Polarimetry, Optical instrument (eg. Eye, Camera, Microscope, Telescope).

UNIT V: Atomic Physics

Black body radiation, Planck's theory, De Broglie waves. Heisenberg's Uncertainty principle, Rutherford's atomic model. Bohr's atomic model of the Hydrogen atom and atomic spectra, Schrodinger's wave equation. Moseley's experiment on X-rays, the diffraction of X-rays and its application, Radioactivity.

Suggested Readings:

1. Basic physics: a self teaching guide – II edition – Carl F Kuhn
2. Handbook of Physics –
3. New simplified physics – S L Arora



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4. A Master Resource book in Physics – D B Singh

Course Outcomes:

1. Explain fundamental concepts and laws of mechanics, thermal physics, electricity, magnetism, and modern physics.
2. Apply principles of classical mechanics and thermodynamics to solve basic problems related to motion, energy, and heat flow.
3. Demonstrate understanding of gas laws, thermodynamic processes, and laws of thermodynamics, including the Carnot cycle and entropy.
4. Develop analytical thinking and problem-solving skills to relate physical laws with real-world phenomena in science and engineering contexts.



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Faculty of Health and Life Sciences

Department of Forensic Science

II Year: III Semester (THEORY)

Ethics in Forensic Science

Code: BFS305

L	T	P	C
3	0	0	3

Course Objective

1. The course objective is to develop the ideology of Forensic Professionalism among the students. Students
2. will gain information about the significance of Ethical Issues for the betterment of Criminal Justice System
3. The ethical guidelines for the researchers will be beneficial for the improvement of research quality.

UNIT I: Forensic Professionalism

Introduction, Ethical Theories, Role of Scientific Expert Witness, Qualification of Scientific Expert Witness, Forensic Professionalism in Teaching and Laboratory.

UNIT II: Ethics for Law Enforcement Agencies

Introduction, Ethical Role of the Investigator, Ethical Training, Rights of Accused, Unethical Behavior by the Investigator, Police-Expert Relationship

UNIT III: Ethics in Court Room

Introduction, Role of Attorney, Attorney-Expert Relationship, Admissibility of Scientific Evidence: The Frye Case, The Daubert Case, Misconduct in the Court Room: Duke Lacrosse Case, Joseph Buffy Case.

UNIT IV: Ethics in Science and Research

Introduction, Science, Technology and Society, Ethics in Research and Publications, Uncertainty, Measurement of Uncertainty, Misconduct in Research, Ethical Committee and Ethical Approval

UNIT V: Codes of Ethics

Definition, Developing Codes of Ethics, Code of Ethics and Conduct, Rule of Professional Conduct, International Forensic Science Professional Codes of Ethics, U.S. Law Enforcement Professional Codes of Ethics.

Suggested Readings

1. Bowen, R.T. Ethics and Practice of Forensic Science 2nd ed. CRC Press (2021)
2. Downs, J.C.U and Swienton, A.R. Ethics in Forensic Science. Academic Press: (2012).

Course Outcome:

1. To develop the ideology of professionalism among the students.
2. To review the significance of ethics among the law enforcement professionals.
3. To understand the value of court room ethics.
4. To develop the ethical practice among the researchers for improving the research quality.
5. To develop awareness of ethical codes among the students and Forensic Professionals



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II Year: III Semester (THEORY)

Constitution of India

Code: BFS306

L	T	P	C
3	0	0	3

Course Objective:

1. To introduce students to the basic structure and philosophy of the Indian Constitution.
2. To create awareness about citizens' rights and duties under the Constitution.
3. To develop an understanding of the relationship between governance, law, and forensic science.
4. To familiarize students with the judiciary and legal framework relevant for forensic experts.
5. To build legal literacy for ethical and responsible professional conduct.

Unit I: Introduction to the Constitution of India

Historical background and making of the Indian Constitution. Preamble to the Constitution: Meaning and significance. Salient features of the Constitution of India, Importance of Constitution for professionals, including forensic experts

Unit II: Fundamental Rights and Duties

Fundamental Rights: Definition, types, and importance, Fundamental Duties: Responsibilities of citizens, Relevance of Fundamental Rights and Duties for forensic science professionals (especially Right to privacy, right to life and liberty)

Unit III: Directive Principles of State Policy (DPSP)

Meaning and significance of DPSP, Classification of DPSP: Social, Economic, Political principles Relationship between Fundamental Rights and DPSP, Impact on law enforcement and justice system

Unit IV: Union Government Structure

Parliament: Lok Sabha and Rajya Sabha – composition, powers, functions, President of India: Election, powers, and functions, Prime Minister and Council of Ministers: Role and responsibilities, Judiciary: Structure of Supreme Court and High Courts – Jurisdiction and powers relevant for forensic science (e.g., role of forensic evidence in judiciary)

Unit V: Legal and Justice System in India (Forensic Relevance)

Criminal Justice System in India: Overview, Role of Forensic Science in administration of justice, Basic understanding of Criminal Procedure Code (CrPC), Indian Evidence Act, and Indian Penal Code (IPC) – relevant sections (basic mention only), Importance of forensic expert witness in court proceedings

Suggested Readings:

1. Durga Das Basu – Introduction to the Constitution of India, LexisNexis.
2. M.P. Jain – Indian Constitutional Law, LexisNexis.
3. J. N. Pandey – The Constitutional Law of India, Central Law Agency.
4. Bare Act – Constitution of India, Government of India Publication.
5. Dr. S. R. Myneni – Indian Constitution, Allahabad Law Agency.
6. P.M. Bakshi – The Constitution of India, Universal Law Publishing.



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Course Learning Outcomes (CLO): After completing this course, students will be able to:

1. Describe the fundamental concepts and features of the Indian Constitution.
2. Understand Fundamental Rights, Duties, and their application in professional life.
3. Explain the Directive Principles and their significance in governance.
4. Summarize the structure and functions of the Parliament, Executive, and Judiciary.
5. Recognize the forensic expert's role in the justice delivery system and understand the basic legal provisions applicable in forensic cases.



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Faculty of Health and Life Sciences

Department of Forensic Science

II Year: III Semester (THEORY)

Technical Writing and Presentation Skills

Code: BFS307

L	T	P	C
2	0	0	2

Course Objectives (CO):

1. To develop students ability to write clear, concise, and accurate technical documents and forensic reports.
2. To enhance professional communication skills, both written and oral, relevant to forensic science practice.
3. To build competency in the preparation and presentation of scientific data and findings.
4. To familiarize students with the structure and style of scientific and forensic technical writing.
5. To cultivate confidence in delivering oral presentations and handling audience questions effectively.

Unit I: Basics of Technical Writing

Introduction to Technical Writing: Definition and characteristics, Difference between technical and non-technical writing, Purpose and importance of technical writing in forensic science.

Structure of technical documents: Title, Abstract, Introduction, Methodology, Results, Discussion, Conclusion, References.

Unit II: Writing Forensic Science Reports

Report writing in forensic science: Crime scene report, laboratory analysis report, evidence report, Case file documentation, and chain of custody writing, Use of tables, charts, and figures in reports, Common errors in forensic report writing, and how to avoid them.

Unit III: Scientific and Academic Writing

Preparing research papers, review articles, and project reports, writing abstracts, summaries, and executive briefs, Citation and referencing styles (APA, MLA, Vancouver, Harvard).

Plagiarism: Awareness, types, and tools for plagiarism checking.

Unit IV: Presentation Skills

Basics of Oral Presentation: Structure, Content, and Language, Use of PowerPoint and Other Presentation Tools (e.g., Prezi, Canva), Voice Modulation, Body Language, and Audience Engagement Techniques, Handling Questions and Doubts During Presentations.

Unit V: Communication and Professional Ethics

Importance of Ethical Communication in Forensic Reporting, Confidentiality and Data Protection in Forensic Communication, Email and Letter Writing for Professional Communication. Drafting cover letters, CVs, and Statement of Purpose (SoP) for internships and jobs in forensic field.

Suggested Readings:

1. Sharma, R. C. & Mohan, K. – Business Correspondence and Report Writing, Tata McGraw Hill.
2. Day, R. A. & Gastel, B. – How to Write and Publish a Scientific Paper, Cambridge University Press.



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3. Lesikar, R.V. & Flatley, M.E. – Basic Business Communication, McGraw Hill.
4. Turabian, K. L. – A Manual for Writers of Research Papers, Theses, and Dissertations, University of Chicago Press.
5. Myneni, S. R. – Professional Communication and Soft Skills, Allahabad Law Agency (for ethics-related content).

Course Learning Outcomes (CLO): After completing this course, students will be able to

1. Write precise and well-structured technical and forensic science reports.
2. Demonstrate knowledge of different formats of scientific and forensic communication.
3. Present forensic findings using effective oral presentation techniques.
4. Use appropriate visual aids and data representation tools in presentations.
5. Apply correct grammar, style, and ethical practices in scientific writing and communication.



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II Year: III Semester (PRACTICAL)

Forensic Psychology Lab

Code: BFS351

L	T	P	C
0	0	2	1

Course Objectives:

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

PRACTICAL

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

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).

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

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



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II Year: III Semester (PRACTICAL)
Forensic Chemistry-I Lab
Code: BFS352

L	T	P	C
0	0	2	1

Course Objectives: Students will understand about the

1. chemical test for identification of explosive residue and diesel and kerosene.
2. They will learn detection methods of alcohol,
3. They will learn about food adulterants.
4. They will learn about drugs of abuse.

PRACTICALS:

1. Processing and Investigation of scene of explosion
2. Photography of scene of explosion
3. Methods of sketching scene of explosion
4. Collection of evidences from the scene of explosion.
5. Packing and forwarding of evidences from the scene of explosion.
6. To carry out chemical tests on explosive substances.
7. To study the components of IED.
8. To carry out analysis of diesel.
9. To carry out analysis of kerosene oil.
10. Preparation of report.
11. To identify ethyl alcohol by chemical tests.
12. To identify ethyl alcohol by breath analyzer
13. To identify methyl alcohol by chemical tests
14. To determine the adulteration in milk by chemical tests.
15. To determine the adulteration in milk products by chemical tests.
16. To determine the adulteration in spices by chemical tests.
17. To determine the adulteration in ghee and oil by chemical tests.
18. To perform colour tests for barbiturates.
19. To perform colour tests for opiates.
20. To perform colour tests for Benzodiazepines.
21. To perform colour tests for amphetamines.

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. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013).
3. J.D. DeHaan, Kirk's Fire Investigation, 3rd Edition, Prentice Hall, New Jersey (1991)

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

1. Know the chemical test for identification of explosive residue
2. Understand chemical test for identification of diesel and kerosene.



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3. Apply the various chemical methods for determination of alcohol compounds.
4. Analyse the adulterants present in edible food products.
5. Perform colour tests for barbiturates and opiates.



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II Year: III Semester (PRACTICAL)

General Physics -II Lab

Code: BFS353

L	T	P	C
0	0	2	1

Course Objectives: Students will understand about the

1. Understand the concept of SHM and time period.
2. Understand energy conversion in rotational systems
3. Understand gas Laws, learn calorimetric measurements and heat transfer mechanisms.
4. Understand electric current and potential difference relation.
5. Learn bridge balancing technique for resistance measurement.

PRACTICALS

1. To determine acceleration due to gravity using a simple pendulum
2. To calculate moment of inertia and g using a compound pendulum.
3. To verify the relation between force, mass, and acceleration.
4. To study the relationship between pressure and volume at constant temperature.
5. To determine the thermal conductivity of a given metal rod.
6. To verify Ohm's law for a given resistor.
7. To determine unknown resistance using a Wheatstone Bridge.
8. To measure magnetic field along axis of a solenoid.
9. To determine the speed of sound using resonance tube method.
10. To determine Planck's constant using stopping potential vs. frequency.

Suggested Readings:

1. B.L. Theraja & A.K. Theraja – Engineering Physics
2. R.K. Gaur & S.L. Gupta – Engineering Physics Laboratory Manual
3. D. Halliday, R. Resnick & J. Walker – Fundamentals of Physics
4. S.L. Arora – B.Sc. Physics Practical Book
5. University Lab Manuals – Purdue Physics Labs, Howard University Physics Experiments

Course Learning Outcomes (CLOs): Upon successful completion of this course, the students will be able to

1. Measure acceleration due to gravity using a simple pendulum and verify the time period-length relationship.
2. Calculate the moment of inertia and local gravitational acceleration using a compound pendulum.
3. Experimentally derive the relationship between force, mass, and acceleration using Atwood's machine.
4. Plot the pressure-volume curve for a gas and confirm the inverse proportionality described by Boyle's law.
5. Calculate the thermal conductivity of a given material by analyzing the rate of heat flow through a metal rod.
6. Accurately determine the specific heat capacity of liquids or solids using calorimetric measurements.
7. Plot and analyze the current-voltage characteristics of a conductor to verify Ohm's law.



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B. Sc. (Honors with Research) Forensic Science
Study Evaluation Scheme (As per NEP2020)
Effective from the session 2025-26

II Year: IV Semester

S No	Course Code	Course	L	T	P	Evaluation Scheme		Total	Credits	Course Type
						CIE	ESE			
Theory										
1	BFS401	Forensic Biology and DNA Analysis	3	0	0	25	75	100	3	Major
2	BFS402	Forensic Medicine	3	0	0	25	75	100	3	Major
3	BFS403	Fundamentals of Forensic Toxicology	3	0	0	25	75	100	3	Major
4	BFS404	Forensic Chemistry-II	3	0	0	25	75	100	3	Minor
5	BFS405	Forensic Physics-I	3	0	0	25	75	100	3	AEC
6	BFS406	Data Science and AI in Forensics	3	0	0	25	75	100	3	SEC
7	BFS407	Human Values and Environmental Studies	2	0	0	25	75	100	2	VAC
Practical										
8	BFS451	Forensic Medicine and DNA Analysis Lab	0	0	2	25	75	100	1	Major
9	BFS452	Forensic Toxicology Lab	0	0	2	25	75	100	1	Major
10	BFS453	Forensic Chemistry-II Lab	0	0	2	25	75	100	1	Major
Total			20	0	6	250	750	1000	23	

Diploma in Forensic Science*

Evaluation Scheme, promotion scheme, grading system, and CGPA calculation adopted from CCFUP, by UGC 2022.

L	Lecture
T	Tutorial
P	Practical
CIE	Continuous Internal Evaluation
ESE	End Semester Examination
GE	Generic Elective
AEC	Ability Enhancement Course
SEC	Skill Enhancement Courses
DSE	Discipline Specific Elective
MD	Multidisciplinary
VAC	Value-added courses common for all UG

*** UG Diploma:** Students who opt to exit after completion of the second year and have secured 80 credits will be awarded the UG diploma if, in addition, they complete one vocational course of 4 credits during the summer vacation of the second year. These students are allowed to re-enter within a period of three years and complete the degree programme within the maximum period of seven years.



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Department of Forensic Science

II Year: IV Semester (THEORY)

Forensic Biology and DNA Analysis

Code: BFS401

L	T	P	C
3	0	0	3

Course Objectives: Students will understand about the

1. Understand biological evidence and its forensic relevance.
2. Learn the collection, preservation, and analysis of biological samples.
3. Understand the principles and techniques of forensic serology and DNA profiling.
4. Familiarize with modern DNA extraction, quantification, amplification, and analysis techniques.
5. Understand the legal, ethical, and quality assurance aspects of forensic DNA analysis.

UNIT I: 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 II: 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 III: Wildlife Forensics and Forensic Entomology

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

UNIT IV: Forensic Importance of Body fluids:

Collection and preservation of blood evidence, Distinction between human and non-human blood. Forensic characterization of bloodstains. Typing of dried stains. Blood enzymes and proteins, Semen. Forensic significance of semen. Composition, functions and morphology of spermatozoa. Collection, evaluation, and tests for identification of semen. Composition, functions, tests and forensic significance of saliva, sweat, milk and urine.

UNIT V: DNA Profiling Techniques

Polymerase Chain Reaction (PCR): Principle and applications, Short Tandem Repeat (STR) typing. Y-STR analysis and mt DNA analysis, DNA sequencing basics, Touch DNA, Low Copy Number (LCN) DNA analysis, Interpretation of DNA profiles: match statistics, probability, and population genetics basics, Mixed DNA samples interpretation, DNA database management: CODIS and NDNAD. Reporting of DNA results, Legal and ethical considerations in forensic DNA analysis



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Suggested Readings:

1. L. Stryer, Biochemistry, 3rd Edition, W. H. Freeman and Company, New York (1988).
2. W. G. Eckert and S. H. James, Interpretation of Bloodstain Evidence at Crime Scenes, CRC Press, Boca Raton (1989).
3. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).
4. G. T. Duncan and M. I. Tracey, Serology and DNA typing, Introduction to Forensic Sciences, 2nd Edition, W. G. Eckert (Ed.), CRC Press, Boca Raton (1997).
5. T. Bevel and R. M. Gardner, Blood stain Pattern Analysis, 3rd Edition, CRC Press, Boca Raton (2008)

Course Learning Outcomes (CLOs): Upon successful completion of this course, the students will be able to

1. Identify and classify different types of biological evidence and understand proper collection techniques.
2. Perform forensic serological tests for detection and confirmation of various body fluids.
3. Explain and apply various DNA amplification and profiling techniques used in forensic casework.
4. Demonstrate the acquisition of comprehensive knowledge and skills related to wildlife and entomology forensics.
5. Demonstrate the acquisition of comprehensive knowledge about Genetic markers and its utility in forensic context



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Faculty of Health and Life Sciences

Department of Forensic Science

II Year: IV Semester (THEORY)

Forensic Medicine

Code: BFS402

L	T	P	C
3	0	0	3

Course Objectives:

1. To study the causes of death, and medico-legal aspects related to death.
2. To understand post mortem examination, and identification of unknown bodies through various means.
3. To study the different types of injuries sustained by a person and
4. To understand the cause, dimensions and age of the injury.
5. To study the examination of such wounds and their medico legal aspects.

UNIT I: Death Investigations-I

Fundamental aspects and scope of forensic medicine. Approaching the crime scene of death. Obtaining first-hand information from the caller. Rendering medical assistance to the victim, if alive. Protecting life. Recording dying declaration, identifying witnesses and, if possible, the suspect. Interviewing onlookers and segregating possible witnesses. Suspect in custody – initial interrogation and searching for evidence. Assessing the crime scene.

UNIT II: Death Investigations – II

Request for forensic team. Importance of the command post and logbook. Management of the crowd and media. Importance of taking notes. Items to be a part of noting, documenting the death scene. Processing evidence, Evaluation of injuries. Importance of the canvass form. Indexing the death investigation. Handling buried-body cases search for buried bodies, methods of exhumation. Suicide cases – evaluating the type of injuries, gauging the psychological state of the victim, and suicide notes.

UNIT III: Forensic Pathology

Forensic pathology, Medico-legal aspects of death. Causes of death. Determination of time since death. Investigation of sexual offences. Death by drowning. Injuries. Types and classification of injuries. Antemortem and post-mortem injuries, Aging of injuries. Artificial injuries.

UNIT IV: Clinical Forensic Medicine, Injuries and Wounds

Investigation of sexual offences, dealing with Medicolegal cases., Evaluation of injuries. Importance of the canvass form. Indexing the death investigation. Handling buried body cases – search for buried bodies, Suicide cases – evaluating the type of injuries, suicide notes, Introduction to wounds; definition, types of injuries: Abrasions, lacerations, Bruises, incised wounds and stab wounds

UNIT V: Forensic Odontology

Development, scope, and role of forensic odontology in mass disaster and anthropology. Types of teeth and their comparative anatomy. Bite marks-Forensic significance of bite marks. Collection, preservation and photography of bite marks evidence. Legal aspects of bite marks. Estimation of age from teeth.

Suggested Readings:

1. K. Smyth, The Cause of Death, Van Nostrand and Company, New York (1982).



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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).

Course Learning Outcomes: At the end of the course, students should be able to

1. Demonstrate the acquisition of comprehensive knowledge and skills related to death investigation
2. Demonstrate the acquisition of comprehensive knowledge about forensic pathology
3. Demonstrate the capability of being the first responding officer in a crime scene
4. Demonstrate the acquisition of comprehensive knowledge and skills about odontology



Mahayogi Gorakhnath University Gorakhpur

Faculty of Health and Life Sciences

Department of Forensic Science

II Year: IV Semester (THEORY)

Fundamentals Of Forensic Toxicology

Code: BFS403

L	T	P	C
3	0	0	3

Course Objectives:

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

UNIT I: Basics of Toxicology

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

UNIT II: Poisons-I

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

UNIT III: Poisons-II

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

UNIT IV: Narcotics, Drugs, and Psychotropic Substances

Definition of narcotics, drugs, and psychoactive substances. Broad classification - Narcotics, stimulants, Depressants, and hallucinogens, General characteristics and common examples of each classification. Designer drugs. Presumptive and screening tests for narcotics, drugs, and psychotropic substances. Human performance toxicology and Dope tests.

UNIT V: Heavy metals and corrosives

Introduction to heavy metal poisoning (Pb, As, Hg, Cd, Zn, Cu), Sign and symptoms, Isolation of heavy metals and their chemical analysis. Corrosive poisons: - Mineral acids- Nitric acid, Hydrochloric acid, Sulphuric acid, Strong Base: Potassium hydroxide, Sodium hydroxide

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).



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4. A.W. Jones, Enforcement of drink-driving laws by use of per se legal alcohol limits: Blood and/or breath concentration as evidence of impairment, Alcohol, Drug and Driving, 4, 99 (1988).
5. Kennedy, Thomas J., Christian, Jr., Donnell Basic Principles of Forensic Chemistry, Springer
6. Saferestein, Criminalistics: An Introduction to Forensic Science. Prentice Hall
7. John D. DeHaan ; Kirk's Fire Investigation, Prentice Hall Eaglewood Cliffs, N.J
8. Yinon J; Modern Methods & Application in Analysis of Explosives, John Wiley.
9. Goutam, M. P. and Goutam S Analysis of Plant Poison, Selective & Scientific Books, New Delhi.
10. Feigl; Spot Test in Organic Analysis, Elsevier Pub., New Delhi.
11. Clark, E.G.C.; Isolation and Identification of Drugs, Vol I&II, Academic Press,
12. Sunshine I; Year book of Toxicology, CRC Press Series, USA
13. Michael J. Deverlanko et al: Hand Book of Toxicology CRC Press, USA. 14. Parikh C.K; Text

Course Learning Outcomes:

1. Will be able to describe varied toxicological science & symptoms of different toxins on body when administered.
2. Learn about the basics of Insecticides and Pesticides.
3. Able to understand the various methods of isolation of poisons.
4. Introduction to Heavy metals and their isolation from tissue.
5. Able to determine the signs and symptoms of Animal and Vegetable Poisons.
6. Build the methods of collection and preservation of toxicological exhibits in fatal and survival cases, medico-legal aspects.



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Department of Forensic Science

II Year: IV Semester (THEORY)
Forensic Chemistry -II
Code: BFS404

L	T	P	C
3	0	0	3

Course Objectives:

1. Introduce students to the scope and significance of chemical analysis in forensic investigations (excluding alcohol, petroleum, explosives, arson, and drugs).
2. Teach students various forensic chemical examination techniques for trace and unknown substances.
3. Familiarize students with instrumental techniques relevant to forensic chemistry.
4. Develop understanding of examination of non-explosive poisons and toxic substances.
5. Enable students to understand forensic analysis of environmental and industrial contaminants relevant to crime scenes.

UNIT I: Chemical Analysis of Trace Evidence

Types and forensic significance of trace evidence: paints, glass, soil, fibres, and dust. Collection, preservation, and preliminary examination of trace materials. Microscopic and chemical examination of paints and fibres.

UNIT II: Environmental and Industrial Pollutants as Forensic Evidence

Introduction to environmental forensics, Chemical analysis of water, air, and soil pollutants. Detection of industrial effluents and heavy metal contamination. Forensic significance of environmental pollutants in criminal cases.

UNIT III: Alcoholic Beverages

Definition, classification of liquors based on origin (Indian Made Foreign Liquors, Country Made Liquors and Illicit Liquors), Characteristics of Beer, wines and Whisky, Congeners in alcoholic beverages, Chemical analysis of Methanol, Ethanol, Denatured spirit

UNIT IV: Food adulteration

Definition of food and food adulteration, food additives and food adulterants. Detection of common adulterants used in food products by physical and chemical methods, Prevention of Food Adulteration Act 1954

UNIT V: Legal Provisions:

Narcotic Drugs & Psychotropic Substances Act 1985, Prevention of Illicit Trafficking in NDPS Act 1985, Drugs Control Act 1950, Drugs & Cosmetics Act 1940 and various amendments in above mentioned acts.

Suggested Readings:

1. Lundquist, F. and Curry, A.S. Methods of Forensic Science. Inderscience Publisher: California; (1963).



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2. Sharma, B.R. Forensic Science in Criminal Investigation & Trials 6th ed. Lexis Nexis: India; (2019).
3. Brown, W. Drinking, Drugs & Driving Drunk: How Different Drugs Affect the Driving Experience 2nd ed. William Gladden Foundation Press: (2011).
4. Crown, D.A. The Forensic Examination of Paints and Pigments. Thomas: (1968).
5. Lappalainen, J. and Pertulla, P. Accident Investigation Techniques. Oshowiki: (2022).
6. Moenssens, A.A. and Inbaw, F.E. Scientific Evidence in Criminal Cases. Foundation Pr: (1986).
7. Winger, G., Woods, J.H. and Hofmann, F.G. A Handbook on Drug and Alcohol Abuse 4th ed. Oxford University Press: London; (2004).
8. Maehly, A. and Stromberg, L. Chemical Criminalistics. Springer: (1981).
9. Cunliffe, F. Criminalistics and Scientific Investigation (Prentice-Hall series in criminal justice). Prentice Hall: (1980).
10. Clarke, E.G.C. and Moffat, A.C. Clarke's Isolation and Identification of Drugs: In Pharmaceuticals, Body Fluids and Post Mortem Material. Pharmaceutical Press: (1986).

Course Learning Outcomes:

1. Analyze and interpret trace chemical evidence like soil, paint, glass, and fibers.
2. Detect and identify non-explosive poisons and toxic substances in forensic samples.
3. Detect common food adulterants using forensic chemical methods.
4. Analyze environmental and industrial pollutants relevant to crime scene investigations.
5. Apply basic instrumental techniques for forensic chemical analysis.



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Faculty of Health and Life Sciences

Department of Forensic Science

II Year: IV Semester (THEORY)

Forensic Physics -I

Code: BFS405

L	T	P	C
3	0	0	3

Course Objectives:

1. The skills in scientific inquiry, problem solving and laboratory techniques
2. The significance of glass and soil examination

UNIT I: Fundamentals of Forensic Physics

Introduction to the Forensic physics, Basics of prevalent physical evidences (soil, glass, fibre, hair and liquids)

UNIT II: Glass Examination:

Glass: Composition (organic and inorganic elements), Analysis using spectroscopic methods. Comparing glass fragments and glass fractures.

UNIT III: Forensic Paint Examination

Introduction to paint chemistry, types of paints and their composition, forensic examination of paints (household and automobile)

UNIT IV: Soil examination

Composition of soil (organic and inorganic), Properties (Colour, density, size distribution of soil particles), Collection and preservation of soil, Mineral and chemical analysis of soil, Density gradient techniques and its importance in criminal investigation

UNIT V: Introduction to various marks: Definition, nature, types of marks, skid marks, tread marks, significance and examination, Definition, nature, types, significance and examination of foot and shoeprints, gait pattern and footprint casting.

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).



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Course Learning Outcomes:

1. The broad base of knowledge in physics.
2. The understanding of laws of nature.
3. To introduce the students to the characteristics and properties of different evidences like glass, soil, paint, hair and fibre, which are normally encountered at the scene of crime.



Mahayogi Gorakhnath University Gorakhpur

Faculty of Health and Life Sciences

Department of Forensic Science

II Year: IV Semester (THEORY)

Data Sciences and AI in Forensics

Code: BFS406

L	T	P	C
3	0	0	3

Course Objectives:

1. To introduce basic concepts of data science and AI with forensic applications.
2. To provide fundamental knowledge of data handling, preprocessing, and visualization techniques for forensic datasets.
3. To understand machine learning models applicable in forensic investigations.
4. To explore AI applications in digital forensics, crime prediction, and forensic image analysis.
5. To highlight ethical, privacy, and legal considerations in using AI for forensic investigations.

UNIT I: Fundamentals of Data Science in Forensics

Role of data science in forensics (crime prediction, evidence analysis), Types of forensic data (digital, biological, chemical), Introduction to AI vs. traditional forensic methods, Overview of data-driven forensic investigations.

UNIT II: Data Preprocessing for Forensic Analysis

Data collection (sensors, databases, crime reports). Cleaning and transforming messy forensic data (handling missing values, outliers), Feature extraction (e.g., DNA sequences, image features).

UNIT III: Basic AI Models for Forensic Pattern Recognition

Supervised learning (classification for fingerprint/face recognition), Unsupervised learning (clustering for crime hotspot analysis), Model evaluation (accuracy, precision, recall).

UNIT IV: AI Applications in Forensic Investigation

AI in digital forensics: email filtering, cybercrime detection. AI in forensic image and video analysis: face recognition, object detection. Predictive policing and crime hotspot analysis using AI. Natural Language Processing (NLP) in forensic text analysis (e.g., threat analysis, authorship attribution)

UNIT V: Ethical, Legal, and Privacy Issues in AI-Forensics

Data privacy and confidentiality in forensic investigations. Bias and fairness in AI models. Legal admissibility of AI-generated forensic evidence. International guidelines and standards for AI in forensics

Suggested Readings:

1. Zeno Geradts (Editor), Katrin Franke (Editor) Artificial Intelligence (AI) in Forensic Sciences ISBN: 978-1-119-81334-7
2. Saini, Kavita & Sonone, Swaroop & Singh Sankhla, Mahipal & Kumar, Naveen. (2024). Artificial Intelligence in Forensic Science: An Emerging Technology in Criminal Investigation Systems. 10.4324/9781003287810.

Course Learning Outcomes:



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1. Understand foundational concepts of Data Science and AI relevant to forensic investigations.
2. Manage and visualize forensic datasets effectively.
3. Apply basic machine learning models for forensic evidence analysis.
4. Demonstrate knowledge of AI applications in digital forensics, crime analysis, and forensic imaging.
5. Recognize ethical, legal, and privacy concerns while using AI tools in forensic contexts.



Mahayogi Gorakhnath University Gorakhpur

Faculty of Health and Life Sciences

Department of Forensic Science

II Year: IV Semester (THEORY)

Human Values and Environmental Studies

Code: BFS407

L	T	P	C
2	0	0	2

Course objectives:

1. To create awareness, conviction & commitment to values for improving the quality of life through education, and for advancing social and human well-being.
2. To develop the ability to distinguish between what is of value and what is superficial in life.
3. To develop the ability to face difficult situations in life boldly and resolve them confidently.
4. Understand and evaluate the global scale of environmental problems; and. Reflect critically on their roles, responsibilities

UNIT I: Human Values

Introduction- Values, Characteristics, Types, Developing Value system in Indian Organization, Values in Business Management, value-based Organization, Trans –cultural Human values in Management. Swami Vivekananda's philosophy of Character Building, Gandhi's concept of Seven Sins, APJ Abdul Kalam's view on the role of parents and Teachers. Human Values and Present Practices – Issues: Corruption and Bribe, Privacy Policy in Web and social media, Cyber threats, Online Shopping, etc. Remedies UK Bribery Act, Introduction to sustainable policies and practices in Indian Economy.

UNIT II: Principles of Ethics

Secular and Spiritual Values in Management- Introduction- Secular and Spiritual values, features, Levels of value Implementation. Features of spiritual Values, Corporate Social Responsibility- Nature, Levels, Phases and Models of CSR, Corporate Governance. CSR and Modern Business Tycoons Ratan Tata, Azim Premji and Bill Gates.

UNIT III: Holistic Approach in Decision making

Decision making, the decision making process, The Bhagavad Gita: Techniques in Management, Dharma and Holistic Management. Discussion through Dilemmas – Dilemmas in Marketing and Pharma Organisations, moving from Public to Private – monopoly context, Dilemma of privatisation, Dilemma on liberalization, Dilemma on social media and cyber security, Dilemma on Organic food , Dilemma on standardization ,Dilemma on Quality standards. Case Studies

UNIT IV: Ecosystem

Concept, structure & functions of ecosystem : producer, consumer, decomposer, foodweb, food chain, energy flow, Ecological pyramids Conservation of Biodiversity- *In-situ* & *Ex-situ* conservation of biodiversity Role of individual in Pollution control Human Population & Environment Sustainable Development India and UN Sustainable Development Goals Concept of circular economy and entrepreneurship

UNIT V: Environmental Laws

International Advancements in Environmental Conservation, Role of National Green Tribunal, Air Quality Index, Importance of Indian Traditional knowledge on environment, Bio assessment of Environmental Quality Environmental Management System, Environmental Impact Assessment and Environmental Audit.



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Faculty of Health and Life Sciences

Department of Forensic Science

SUGGESTED READING

1. A foundation course in Human Values and Professional Ethics by RR. Gaur, R. Sangal et.al
2. JUSTICE: What's the Right Thing to Do? Michael J. Sandel.
3. Human Values by A. N. Tripathi New Age International
4. Environmental Management by N.K. Uberoi

Course Learning Outcome (CLO): The mission of the course on Human Values and Environmental Studies is to create morally articulate solutions to be truthful and just and to become responsible towards humanity. The course seeks to establish a continuous interest in the learners to improve their thought process with intent to develop a new generation of responsible citizens capable of addressing complex challenges faced by the society due to disruptions in human interactions effecting human values. This course works toward

1. Building fundamental knowledge of the interplay of markets, ethics, and law,
2. Look at various challenges faced by individual to counter unethical issues
3. Look at core concepts for business ethics
4. Look at core concepts of anti-corruption
5. Look at core concepts for a morally articulate solution evolver to management issues in general,
6. Issues of sustainable development for a better environment.
7. To know how environmental degradation has taken place.
8. Be aware of negotiations and international efforts to save environment.
9. How to develop sustainably?
10. Efforts taken up by UN in Sustainable Development.
11. Efforts taken by India in Sustainable Development.



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Faculty of Health and Life Sciences

Department of Forensic Science

II Year: III Semester (PRACTICAL)

Forensic Medicine and DNA Analysis Lab

Code: BFS451

L	T	P	C
0	0	2	1

Course Objectives:

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

PRACTICALS

1. 4. To design a canvass form giving description of an unidentified victim.
2. To study sexual assault examination protocol of the victim.
3. To study and examine various types of mechanical injuries.
4. To study and examine various types of chemical injuries.
5. To study and examine various types of bum injuries.
6. To design a protocol of media disclosure.
7. To a preserve and analyse bite marks.
8. To study and examine Ligature marks.
9. To observe post-mortem examination.
10. To design a questionnaire for the first responder to the death scene.
11. To design a protocol to deal with the media at the crime scene.
12. To design a checklist for forensic scientists at the death scene.

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).

Course Outcomes (COs): The students will able to understand

1. The importance of ascertaining whether the crime was staged to appear as a suicide or accident.
2. The protocol to deal with the media at the crime scene, and also questionnaire for first responders at the crime scene.



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Faculty of Health and Life Sciences

Department of Forensic Science

II Year: III Semester (PRACTICAL)

Forensic Toxicology Lab

Code: BFS452

Course Objectives:

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

L	T	P	C
0	0	2	1

PRACTICALS:

1. To identify biocides.
2. To identify metallic poisons.
3. To identify organic poisons.
4. To perform chloroform testing.
5. To perform colour tests for barbiturates
6. To perform screening test for nicotine
7. To perform screening test for cannabis
8. To perform screening test for opioids.
9. To identify the Arsenic in the given sample
10. To identify the Lead in the given sample
11. To identify the Mercury in the given sample

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. Poklis, Forensic toxicology in, Introduction to Forensic Sciences, 2nd Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).
5. A.W. Jones, Enforcement of drink-driving laws by use of per se legal alcohol limits: Blood and/or breath concentration as evidence of impairment, Alcohol, Drug and Driving, 4, 99 (1988).
6. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013).

Course Outcome: Students will be able to

1. know the types of evidence found at death scene.
2. identify metallic poisons.
3. Analyze Corrosive poisons.
4. Perform chemical tests for the presence of Insecticides and Pesticides
5. Identification of different Vegetable Poison by Colour Test
6. Compile the types of toxins and their examination by chemical tests.



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Faculty of Health and Life Sciences
Department of Forensic Science

II Year: III Semester (PRACTICAL)
Forensic Physics Lab-I
Code: BFS453

Course Objectives:

L	T	P	C
0	0	2	1

1. Able to apply modern methods of forensic analysis in lab
2. In communicating or defending forensic evidence in oral or written
3. To provide depth knowledge related to firearm

PRACTICALS:

1. Analysis of fractured glass
2. Analysis of Paint chips
3. Comparative analysis of Glass fragments.
4. Analysis of soil (Density gradient)
5. Differentiation of soil on the basis of pH.
6. Size distribution analysis of soil particles.
7. Analysis of different tyre marks.

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).

Course Outcome: Students will be able to

1. To gain knowledge about determining the gait pattern and foot print.
2. Lifting and Casting of Tyre/Foot Wear Impressions
3. To compare paint samples and soil samples.
4. To identify and compare tool marks and grass fractures.
5. Comparison of fired bullets and fired cartridge case.
6. Estimate the gunshot residue with different techniques.



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B.Sc. (Honors with Research) Forensic Science
Study Evaluation Scheme (As per NEP2020)
Effective from the session 2025-26

III Year: V Semester

S No	Course Code	Course	L	T	P	Evaluation Scheme		Total	Credits	Course Type
						CIE	ESE			
Theory										
1	BFS501	Forensic Anthropology	3	0	0	25	75	100	3	Major
2	BFS502	Digital Forensic and Cyber Law	3	0	0	25	75	100	3	Major
3	BFS503	Forensic Ballistics	3	0	0	25	75	100	3	Minor
4	BFS504	Forensic Physics-II	3	0	0	25	75	100	3	Major
5	BFS505	Forensic Photography	2	1	0	25	75	100	3	AEC
6	-----	Discipline Specific Elective-1	3	0	0	25	75	100	3	SEC
7	BFS506	Communication Skills and Personality Development	2	0	0	25	75	100	2	VAC
Practical										
8	BFS551	Forensic Anthropology and Forensic Chemistry-II Lab	0	0	2	25	75	100	1	Major
9	BFS552	Digital Forensic and Cyber Law Lab	0	0	2	25	75	100	1	Major
10	BFS553	Summer Training/Internship	0	0	4	25	75	100	2	SI
Total			19	1	8	250	750	1000	24	

Evaluation Scheme, promotion scheme, grading system, and CGPA calculation adopted from CCFUP, by UGC 2022.

L	Lecture
T	Tutorial
P	Practical
CIE	Continuous Internal Evaluation
ESE	End Semester Examination
GE	Generic Elective
AEC	Ability Enhancement Course
SEC	Skill Enhancement Courses
DSE	Discipline Specific Elective
MD	Multidisciplinary
VAC	Value-added courses common for all UG
SI	Summer Internship

Discipline Specific Elective-1	
Course Code	Course Name
BFS521	Molecular Techniques
BFS522	Accident Investigation
BFS523	Food Toxicology
BFS524	Forensic Food Analysis



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Department of Forensic Science

III Year: V Semester (THEORY)

Forensic Anthropology

Code: BFS501

L	T	P	C
3	0	0	3

Course objectives:

1. At the end of the course student should be able to
1. Importance of forensic anthropology in identification of persons.
2. Different techniques of facial reconstruction and their forensic importance.
3. Significance of somatoscopy and somatometry.

UNIT I: Significance of Forensic Anthropology

Scope of forensic anthropology. Study of human skeleton. Nature, formation, and identification of human bones. Determination of age, sex, stature from skeletal material.

UNIT II: Personal Identification

Somatoscopy and Somatometry - Somatoscopy – observation of hair on head, forehead, eyes, root of nose, nasal bridge, nasal tip, chin, Darwin's tubercle, ear lobes, supra-orbital ridges, physiognomic ear breadth, circumference of head. Scar marks and occupational marks.

UNIT III: Somatometry

measurements of head, face, nose, cheek, ear, hand and foot, body weight, height - Indices - cephalic index, nasal index, cranial index, upper facial index.

UNIT IV: Facial Reconstruction

Portrait Parle/ Bertillon system. Photofit / identi kit. Facial superimposition techniques - Cranio facial super imposition techniques photographic super imposition, video super imposition,

UNIT V: 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 READING:

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).

Course Learning Outcome (CLO): Upon successful completion of this course the student will:

1. Demonstrate the acquisition of comprehensive knowledge and skills related to forensic anthropology in identification of persons
2. Demonstrate the acquisition of comprehensive knowledge and skills related to human bones
3. Demonstrate the acquisition of comprehensive knowledge and skills related to somatoscopy and somatometry
4. Demonstrate the acquisition of comprehensive knowledge and skills required for facial reconstruction and its implication in forensic science.



Mahayogi Gorakhnath University Gorakhpur
Faculty of Health and Life Sciences
Department of Forensic Science

III Year: V Semester (THEORY)
Digital Forensic and Cyber Law
Code: BFS502

L	T	P	C
3	0	0	3

Course objectives: This is an introductory course on Digital Forensic and Cyber Law. The specific objectives of the course are as follows:

1. The basics of digital forensics.
2. The cases which fall under the purview of digital crimes.
3. The types of digital crimes.
4. The elements involved in investigation of digital crimes.
5. The basic knowledge of Cyber Law

Unit I: Fundamentals and Concepts

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

Unit II: 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 III: Computer Forensics Investigations

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

Unit IV: Cyber Law: Indian Judiciary and Criminal Justice System

Hierarchy and Powers of the Court, Introduction to Criminal Justice System, Process and Parts of Criminal Justice System, Agencies involved in Crime Investigation, Medico-legal Experts, Judicial Officers. Court Procedure: Examination in Chief, Cross Examination and Re-examination. Court Testimony: Admissibility of Expert Testimony. Police: State and Central level, Role and Function of Police, Police and Forensic Scientist relationship.

Unit V: Legal Provisions Related to Forensic Science

Constitution of India: Preamble, Article 20, 21, 22. Indian Penal Code: Introduction, offences against Person – Sections 299, 302, 304B, 306, 307, 319, 320, 326, 339, 340, 351, 359, 362, 375, 376, 377. Offences against Property- Sections 378, 383, 390, 499. Indian Evidence Act- Sections 32, 45, 46, 47, 57, 58, 60, 73, 135, 136, 137, 159. Criminal Procedure Code: Sections 291, 292, 293.

SUGGESTED READING



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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. Sharma, B.R. Forensic Science in Criminal Investigation and Trails. Universal Law Publishing: (2003).
6. Khazanie, R. Elementary Statistics in a Word of Application. Goodyear Publication: California; (1979).
7. The Indian Evidence Act (1872), Amendment Act (2002), Universal Law Publication: (2003).
8. The Code of Criminal Procedure (1973), Amendment Act (2001), Universal Law Publication: (2002).
9. Lal, R and Lal, D. The Indian Penal Code 28th ed. Wadhwa & Co: Nagpur; (2002).
10. Swanson, C.R., Territo, L.I. and Taylor, R.W. Police Administration: Structures, Processes and Behaviour 8th ed. Pearson: USA; (2012).
11. Ahuja, R. Criminology. Rawat Publication: Jaipur; (2000).
12. Meguire, M., Morgan, R. and Reiner, R. The Oxford Handbook of Criminology 2nd ed. Oxford University Press: New York; (2002).
13. Bag, R.K. Supreme Court on Criminal Law. Asia Law House: (1999).
14. Deb, R. Criminal Justice. The Law Book Co. Pvt. Ltd: Allahabad; (1998).
15. Seigel, J.A., Saukko, P.J. and Knupfer, G.C. Encyclopaedia of Forensic

Course Learning Outcome (CLO): Upon successful completion of this course the student will:

1. To get introduced to the basic concepts of Digital Forensic and Cyber Law.
2. Explain about the computer's Hardware and accessories of basics of digital forensics.
3. To demonstrate cases which fall under the purview of digital crimes.
4. To understand about basic knowledge of Cyber Law



Mahayogi Gorakhnath University Gorakhpur

Faculty of Health and Life Sciences

Department of Forensic Science

III Year: V Semester (THEORY)

Forensic Ballistics

Code: BFS503

L	T	P	C
3	0	0	3

Course objectives: The specific objectives of the course are as follows:

1. This course would introduce the students to the types, characteristics and identification of firearms and ammunition.
2. Students will get knowledge about the linkage of firearm and ammunition, the legal aspects involving firearms
3. Determination of range of firing and introduction to exterior ballistics.
4. The information about the explosives is focused towards the understanding the basic concepts of explosion scene.

UNIT I: Introduction to Fire Arms and Ammunitions

Firearms: Definition, Classification of Firearms, Development, working, advantages and disadvantages of: Hand Cannon, Match Lock, Flint Lock, Wheel Lock and Percussion Lock firearms. Characteristics and firing mechanism of different Modern Firearms (Revolver, Pistol, Shot gun, Semi-automatic and Fully automatic firearms), Introduction to country made firearms. **Ammunition:** Definition, Types, Components of Cartridge: Cartridge case, Primer, Propellant, Wads, Projectile.

UNIT II: Internal Ballistics

Definition, Propellant: Shape and Size of the propellant, Ignition of the propellant, manner of burning, Lock time, Ignition time, barrel time, muzzle velocity, factors affecting muzzle velocity, theory of recoil.

UNIT III: External Ballistics

Definition, Shape of bullet, Effect of air on trajectory, drag, drop, drift, yaw, Projectile stability, Range: effective range, extreme range. Factors affecting the range of projectile.

UNIT IV: Wound /Terminal Ballistics

Introduction, Firearm Injuries: Types and Characteristics, Scorching, Burning, Blackening, Cavitation effect, Stopping power, Ricochet, Range determination from different type of firearms (smooth bore and rifled bore). Firearm- Ammunition Linkage: Identification of bullets, Test fire, Bullet recovery, Comparison of marks on bullets, cartridge case. Gun Shot Residue: Definition, Composition, Location, Collection, Evaluation and Forensic significance.

UNIT V: Forensic Explosives

Definition, Classification, composition and characteristics, IED, Explosion process, Reconstruction of sequence of events, Post blast residue collection, Forensic examination of various explosive materials.

SUGGESTED READING

1. Mathew, J.H. Firearms Identification 2nd ed. Springfield: Illinois;(1973).
2. Hatcher, J.S., Jury, F.J. and Weller, J. Firearms Investigation, Identification and Evidence. Ray Riling Arms Books: Philadelphia; (2006).
3. DiMaio, M.D. Gunshot Wounds. CRC Press: Washington DC; (1999).
4. Heard, B.J. Handbook of Firearms and Ballistics. Jhon Willey: England; (1997).
5. Warlow, T. Firearms, The Law and Forensic Ballistics. Taylor& Francis: London; (1996).



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6. Sellier, K.G. and Kneubuehl, B.P. Wound Ballistics and the Scientific Background. Elsevier: London; (1994).
7. Johari, M. Identification of Firearms, Ammunition and Firearms Injuries. BPR&D: New Delhi; (1980).
8. Hogg, I.V. The Cartridges Guide: A Small Arms Ammunition Identification Manual. Stackpole Co:Philadelphia; (1982).
9. Working Procedures Manual: Ballistics. BPR&D: New Delhi; (2000).
10. Boudreau, J.F., Kwan, Q.Y., Faragher, W.E. and Denault, G.C. Arson and Arson Investigation: Survey & Assessment. National Institute of Law Enforcement, Dept. of Justice, US Govt. Printing Press: USA; (1977)
11. Dehaan, J.D. Kirk's Fire Investigation 5th ed. Prentice Hall: Eaglewood Cliffs; (2002).
12. Jitrin, Y. Modern Methods & Application in Analysis of Explosives. John Wiley & Sons: England; (1993).
13. Working Procedure Manual; Chemistry, Explosives and Narcotics, BPR&D Publications: New Delhi; (2000).

Course Learning Outcome (CLO): Upon successful completion of this course the student will:

1. To understand the historical development and basic concepts of Firearms and Ammunition.
2. To understand the various aspects of internal ballistics.
3. To develop the conceptual understanding of external ballistics.
4. To evaluate and interpret crucial information from firearm injuries and understand the concepts behind linkage of firearm and ammunition.
5. To build up conceptual understanding of explosives and its forensic aspects.



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Department of Forensic Science

III Year: V Semester (THEORY)

Forensic Physics-II

Code: BFS504

L	T	P	C
3	0	0	3

Course Objectives:

1. Understand principles of forensic optics, acoustics, and thermodynamics in forensic applications.
2. Apply physics-based methods for forensic document and toolmark examination.
3. Analyze ballistic and firearm evidence through physical principles.
4. Interpret forensic imaging and photographic techniques.
5. Utilize physical methods for investigation of explosive

UNIT I: Forensic Optics and Imaging

Principles of light and optics in forensic science, Optical instruments used in forensic examination (microscopes, polarizing microscopes), Forensic photography: techniques, imaging methods, and digital enhancements, Infrared and ultraviolet imaging in evidence detection

UNIT II: Ballistics and Firearm Physics

Basic physics of ballistics: internal, external, and terminal ballistics, Firearm mechanisms and ammunition types, Bullet trajectory analysis and reconstruction, Gunshot residue analysis and detection techniques

UNIT III: Forensic Acoustics and Vibrations

Acoustic wave propagation and forensic audio analysis. Sound recording and voice identification techniques, Vibrational analysis for toolmarks and impact signatures, Use of spectral analysis in forensic audio investigations

UNIT IV: Thermodynamics and Fire Scene Investigation

Heat transfer mechanisms: conduction, convection, radiation in fire scenes, Analysis of burn patterns and fire dynamics, Identification of accelerants using thermal analysis methods, Physics of explosions and blast wave characterization

UNIT V: Forensic Document and Tool mark Examination

Physical characteristics of inks, papers, and printing methods, Microscopic and spectroscopic examination of documents, Toolmark analysis: theory, types, and comparison methods, Forensic reconstruction of mechanical imprints and indents

SUGGESTED READINGS

1. D. James, Forensic Optics: A Practical Guide by Wiley, 2018.
2. R. McCoy, Principles of Ballistics by CRC Press, 2019.
3. by K. Smith, Forensic Acoustics and Audio Analysis Academic Press, 2017.



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Course Learning Outcome (CLO): Upon successful completion of this course the student will:

1. Explain optical principles relevant to forensic investigations.
2. Describe ballistic principles and firearm functioning.
3. Understand acoustic principles in forensic contexts.
4. Acoustic wave propagation and forensic audio analysis
5. Explain thermodynamic principles relevant to fire investigations.



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III Year: V Semester (THEORY)

Forensic Photography

Code: BFS505

L	T	P	C
2	0	0	2

Course objectives: The objectives of this course are:

1. To Develop a sense of Photography.
2. To have an overview of Document Photographic Technique.
3. To have the knowledge of digital photography.

UNIT I: Camera

Study of different parts of camera. Contact and Tricky Photography

UNIT II: Currency notes photography

Photography of currency notes, Photography of Watermark and wire marks

UNIT III: Types of photography

Close up photography of Documents, Photography under UV and IR Light, Transmitted and oblique light photography. To take photographs using different filters.

UNIT IV: Physical evidence photograph

Photography of Secret Writing, Photography of fingerprints, Photography of lip prints and ear prints. Photography of bite marks on body. Photography of footwear impressions. Photography of Tyre and skid Marks

UNIT V: Indoor and outdoor photography

Close up and distant Photography of indoor crime scene, Close up and distant Photography of outdoor crime scene, Photography of moving objects. To take photographs of crime scene exhibits at different angles. To record video of a crime scene.

SUGGESTED READINGS

1. David R.Redsicker; The Practical Methodology of Forensic Photography- 2nd Ed. CRC Press LLC (2001)
2. R.E. Jacobson, S.F.Ray, G.G.Attridge, The Manual of Photography- Photographic and Digital Imaging , N.R. Oxford.
3. Forensic Digital Imaging and Photography – (2001) by Herbert L. Blitzer and Jack Jacobia
4. Advanced Crime Scene Photography (2010) by Christopher D Duncan

Course Learning Outcome (CLO): Upon successful completion of this course, students should be able to understand:

1. Know the concept of contact and tricky Photography.
2. Understand the Photography of Watermark and wire marks.
3. Apply knowledge of photography techniques – Close up photography, UV, IR for Documents examination.
4. Analyze the secret writing and fingerprints by photography.
5. Evaluate and record the evidence in indoor and outdoor crime scenes.
6. Design the photography methods for indoor and outdoor crime separately



Mahayogi Gorakhnath University Gorakhpur
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Department of Forensic Science

III Year: V Semester (THEORY)
Discipline Specific Elective-1
Molecular Techniques
Code: BFS521

L	T	P	C
3	0	0	3

Course objectives: The specific objectives of the course are as follows:

1. To introduce students to molecular techniques relevant to forensic investigations.
2. To develop an understanding of DNA profiling, amplification, and analysis in criminal cases.
3. To provide knowledge of extraction, quantification, and interpretation of nucleic acids from forensic samples.
4. To train students in selecting and applying appropriate molecular tools in crime labs.
5. To sensitize students to the legal, ethical, and reporting aspects of molecular forensic analysis.

UNIT I: Fundamentals of Forensic Molecular Biology

Introduction to forensic molecular biology, Structure and function of DNA and RNA, Types of DNA: nuclear vs mitochondrial. Overview of forensic DNA evidence: history, significance, and legal context. Contamination control in forensic molecular work

UNIT II: DNA Extraction and Quantification from Forensic Samples

Sources of DNA in forensic evidence: blood, saliva, semen, bones, hair. Methods: organic extraction, Chelex, silica-based, magnetic bead-based methods. DNA quantification: spectrophotometry, fluorometry, qPCR-based methods. Quality assessment and challenges in degraded/trace DNA samples

UNIT III: PCR and DNA Amplification Techniques

Principle and components of PCR. STR amplification, multiplex PCR, Real-time PCR and RT-PCR in forensic casework, Touch DNA and low-copy number DNA (LCN-DNA) challenges. DNA inhibitors and reaction optimization

UNIT IV: DNA Profiling and Human Identification

STR analysis and interpretation, VNTRs, SNPs, and mitochondrial DNA analysis, Capillary electrophoresis-based fragment analysis, DNA databases (CODIS, NDDDB - India). Kinship analysis and paternity testing

UNIT V: Advanced Molecular Techniques and Legal Aspects

Y-STR, X-STR, and lineage markers. Next-generation sequencing (NGS) in forensics (overview). Forensic applications of mRNA, microRNA, and epigenetic markers. Reporting and presenting DNA evidence in court. Ethical issues and admissibility of molecular evidence

SUGGESTED READING

1. **Butler JM.** *Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers*, Academic Press



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2. **Budowle B, Schutzer SE et al.** *Forensic Microbiology*, ASM Press
3. **James SH, Nordby JJ.** *Forensic Science: An Introduction to Scientific and Investigative Techniques*, CRC Press
4. **Kirby LT.** *DNA Fingerprinting: An Introduction to Genetic Fingerprinting*, Palgrave Macmillan
5. **Richard Li.** *Forensic Biology*, 2nd Edition, CRC Press
6. **Lynch M.** *God's Signature: DNA Profiling, the New Gold Standard in Forensics*, Harvard University Press
7. Articles from journals: *Forensic Science International: Genetics*, *Journal of Forensic Sciences*, *Science & Justice*
8. **DNA Technology in Forensic Science**, National Research Council (US), National Academies Press

Course Learning Outcome (CLO): Upon successful completion of this course the student will:

1. Explain the principles and forensic applications of molecular biology techniques.
2. Perform or interpret nucleic acid extraction and amplification from forensic samples.
3. Understand DNA profiling and related procedures for human identification.
4. Evaluate the relevance and reliability of molecular evidence in legal cases.
5. Apply molecular techniques in forensic investigations involving identity, paternity, and crime scene analysis.



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III Year: V Semester (THEORY)
Discipline Specific Elective-1
Accident Investigation
Code: BFS522

L	T	P	C
3	0	0	3

Course objectives: The specific objectives of the course are as follows:

1. The method of searching, collecting, preserving and analyzing arson evidence.
2. The concept of road crash investigation and method of searching, collecting, and analysis of evidence in road accident cases.

UNIT I: Fire and Arson Investigation

Chemistry of fire, Fire Triangle, Fire Tetrahedron, cause of fire and origin of fire. Material and Chemicals use in initiating fire. **Arson:** Legal Definition, Arson motives, difference between Arson and Fire, Forensic and legal Concepts.

UNIT II: Arson Investigation

Fire scene patterns. Location of point of ignition. Searching the fire scene. Collection and preservation of arson evidence. Analysis of fire debris. Analysis of ignitable liquid residue. Post-flashover burning. Scientific investigation and evaluation of clue materials. Information from smoke staining.

UNIT III: Road Crash Investigation

Process and Provisions- Objectives, Responsibilities of the Investigation Officer at the Scene, series of events description, Identifying Contributory and Precipitating Factors. Legal provisions of Motor Vehicle Act.

UNIT IV: Investigation Procedures:

Expert Response required at the scene and their specific roles. Protecting the scene, caring for the injured, searching the scene and vehicular, Recording the scene: photography and measuring and sketching the accident scene, collection of evidences.

UNIT V: Evidence Evaluation:

Vehicle damage, tire marks, skid marks, sideslip marks, yaw marks, debris. Mechanical inspection of the vehicle: examination of accelerator, brake system, body damage of vehicle, horn, lights, mirrors, air bags, steering systems, tires condition. Assessing the injury patterns in accident cases, victim identification and post mortem findings.

SUGGESTED READING:

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. J.D. DeHaan, Kirk's Fire Investigation, 3rd Edition, Prentice Hall, New Jersey (1991).
4. T.L. Bohan and A.C. Damask, Forensic Accident Investigation: Motor Vehicles, Michie Butterworth, Charlottesville (1995).
5. 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).



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

Course Learning Outcome (CLO): Upon successful completion of this course the student will:

1. Know the chemistry of fire and difference between fire and arson.
2. Understand the procedure for the collection of evidence in fire and arson cases.
3. Get information about process and provisions of road crash investigation.
4. Analyze the scene of road accident and collection of evidence.
5. Evaluate the evidence to determine the reasons of road crash.
6. Construct the procedure of fire debris and post flashover burning and information from smoke staining.



Mahayogi Gorakhnath University Gorakhpur
Faculty of Health and Life Sciences
Department of Forensic Science

III Year: V Semester (THEORY)
Discipline Specific Elective-1
Food Toxicology
Code: BFS523

L	T	P	C
3	0	0	3

Course objectives: The specific objectives of the course are as follows:

1. Able to understand the various types of poisons and their methods of isolation.
2. To develop a basic level of knowledge about the health hazards of animal and vegetable poisons.
3. Provides basic information about pesticides.

UNIT I: Introduction and classification of poison

Introduction, History and Pioneers (Paracelsus, Mary Blandy James Marsh and M. J. B. Orfila), Introduction and concept of toxicology: LD 50, LC 50, Lethal dose, lethal period, Fatal period and its forensic significance; Poisons: classification of poisons, types of poisoning, Absorption, Metabolism and Excretion of toxins, collection and preservation of toxicological exhibits in fatal and survival cases, medico-legal aspects.

UNIT II: Insecticides and Pesticides

Organophosphorous compounds- Nature, administration, symptoms, post-mortem findings, detection, estimation and medico-legal aspects. Organochloro Compounds- Nature, administration, symptoms, post-mortem findings, detection, estimation and medico-legal aspects.

Carbamates- Nature, administration, symptoms, post-mortem findings, detection, estimation and medico-legal aspects.

UNIT III: Isolation techniques of poisons

Isolation methods of chemical substances from viscera and other relevant materials- Non-volatile organic poisons: - Stas-Otto Method, Ammonium Sulphate Method, Tungstate and Acid Digest Method, Toxic cations (Metals)- Dry Ashing & Wet Digestion Methods, Toxic Anions, Dialysis Methods, Total Alcoholic Extract

UNIT IV: Heavy metals and corrosives

Introduction to heavy metal poisoning (Pb, As, Hg, Cd, Zn, Cu), Sign and symptoms, Isolation of heavy metals and their chemical analysis. Corrosive poisons: - Mineral acids- Nitric acid, Hydrochloric acid, Sulphuric acid. Strong Base: Potassium hydroxide, Sodium hydroxide

UNIT V: Animal and Vegetable Poisons

Animal poisons: Snake, scorpions and Cantharides. Vegetable Poisons: Dhatura, Oleander, Madar, Abrus precatorius, Castor, Cannabis, Nux vomica, cyanide, etc. Nature, administration, symptoms, post-mortem findings, detection and medico-legal aspects.

SUGGESTED READING:

1. Dr. S. N. Tiwari- Analytical methods in forensic Toxicology
2. Nicholas T Lappas- Forensic Toxicology



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Course Learning Outcome (CLO): Upon successful completion of this course the student will:

1. Will be able to describe varied toxicological science & symptoms of different toxins on body when administered.
2. Learn about the basics of Insecticides and Pesticides.
3. Able to understand the various methods of isolation of poisons.
4. Introduction to Heavy metals and their isolation from tissue.
5. Able to determine the signs and symptoms of Animal and Vegetable Poisons.
6. Build the methods of collection and preservation of toxicological exhibits in fatal and survival cases, medico-legal aspects.



Mahayogi Gorakhnath University Gorakhpur
Faculty of Health and Life Sciences
Department of Forensic Science

III Year: V Semester (THEORY)
Discipline Specific Elective-1
Forensic Food Analysis
Code: BFS524

L	T	P	C
3	0	0	3

Course objectives: The specific objectives of the course are as follows:

1. To educate about common food detection.
2. To impart knowledge in the legislative aspects of Forensic Food Analysis.
3. To educate about standards and composition of foods and role of consumer

UNIT I: Milk and their products

Detection of cane sugar in milk, Detection of starch in milk (Starch- iodide test): Detection of added urea in milk, Detection of skimmed milk powder in milk

UNIT II: Analysis of Ghee:

Detection of Vanaspati in Ghee in Deshi Ghee, Detection of Refined vegetable oils in ghee

UNIT III: Detection of oils and fats:

Detection of argemone oil in mustard oil. Detection of in mustard oil

UNIT IV: Analysis of spices and condiments

Detection of Metanil yellow in the turmeric powder, To detect the presence of starch of maize, wheat and rice in the turmeric, Examination of coriander powder, Detect the colored dye in the chilli powder

UNIT V: Food Analysis awareness campaign – know your food quality

Analysis of consumer redressal through case study, Food adulteration awareness campaign

SUGGESTED READING

1. Dr. S. N. Tiwari- Analytical methods in forensic Toxicology, Delvin S.- Explosives
2. Nicholas T Lappas- Forensic Toxicology

Course Learning Outcome (CLO): Upon successful completion of this course the student will:

1. Gain the knowledge about characteristics milk.
2. Understand the testing methods of ghee detection.
3. Apply the methods for detection of oil and fats.
4. Analyse spices and condiments.
5. Gain the knowledge about the food analysis



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III Year: V Semester
Communication Skills and Personality Development
Code: BFS506

L	T	P	C
2	0	0	2

Course objectives: The specific objectives of the course are as follows:

1. To introduce Communication skills and Personality development
2. Focuses on learning the important skill sets that helps you effectively communicate
3. To introduce efficiently communicate your ideas and messages in simple ways and also on time.

UNIT I: Personality Development

Understanding Personality, Definition and Meaning of Personality, Types of Personality, Components of Personality, Determinants of Personality, Assessment of Personality.

UNIT II: Personal grooming

Dress for success, Make up & skin care, Hair care & styles for formal look, Art of accessorizing, Oral Hygiene.

UNIT III: Interview preparation and group discussion

Meaning and Types of Interviews [Face to Face, Telephonic, Video], Interview procedure [Opening, Listening, Closure], Preparation for Interview, Resume Writing, LinkedIn Etiquette, Meaning and methods of Group Discussion, Procedure of Group Discussion, Group Discussion simulation, Group discussion common error.

UNIT IV: Body language and behavior

Concept of human behavior, Individual and group behavior, Developing Self-Awareness, Behavior and body language, Dimensions of body language: Proxemics, Haptics, Oculistics, Paralanguage, Kinesics, Sign Language, Chromatics, Chronemics, Olfactics, Cultural differences in Body Language, Business Etiquette & Body language, Body Language in the Post Corona Era, Virtual Meeting Etiquette, Social Media Etiquette.

UNIT V: Art of good communication

Communication Process, Verbal and Non-verbal communication, 7 C's of effective communication, Barriers to communication, Paralinguistics, Pitch, Tone, Volume, Vocabulary, Word stress, Pause, Types of communication, Assertive, Aggressive, Passive Aggressive, Listening Skills, Questioning Skills, Art of Small Talk, Email Writing.

SUGGESTED READING

1. Cloninger, S.C., "Theories of Personality: Understanding Person", Pearson, New York, 2008, 5th edition.
2. Luthans F, "Organizational Behaviour", McGraw Hill, New York, 2005, 12th edition.
3. Barron, R.A. & Brian D, "Social Psychology", Prentice Hall of India, 1998, 8th edition.

Course Learning Outcome (CLO): Upon successful completion of this course the student will:

1. To understand the concept of Personality and personal grooming pertains
3. To learn effectively interview and resume preparation.
4. To understand effectively in group discussions and explore communication beyond language



Mahayogi Gorakhnath University Gorakhpur

Faculty of Health and Life Sciences

Department of Forensic Science

III Year: V Semester (PRACTICAL)

Forensic Anthropology and Forensic Physics-II Lab

Code: BFS551

L	T	P	C
0	0	2	1

Course objectives: The course aims to make students gain knowledge in the current trends and techniques in Forensic Anthropology and Forensic Physics-II. The specific objectives of the course are as follows:

1. Importance of forensic anthropology in identification of persons.
2. Different techniques of facial reconstruction and their forensic importance.
3. Significance of somatoscopy and somatometry.

PRACTICALS

1. To determine of age from skull and teeth.
2. To determine of sex from skull.
3. To determine sex from pelvis.
4. To study identification and description of bones and their measurements.
5. To investigate the differences between animal and human bones.
6. To understand the working of a polarizing microscope and examine physical evidence such as fibres, ink particles, or printed material.
7. To use infrared (IR) and ultraviolet (UV) photography to detect alterations or hidden elements in forensic samples
8. To record, visualize, and analyze sound waves and identify differences in speech patterns using software-based sound spectrograph analysis.
9. To compare toolmarks created by different instruments on soft metals and analyze matching patterns using a comparison microscope.
10. To detect and interpret heat signatures on various objects using a thermal imaging camera, demonstrating its use in locating bodies or hotspots at fire scenes.

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).



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III Year: V Semester (PRACTICAL)

Digital Forensic and Cyber Law Lab

BFS552

L	T	P	C
0	0	2	1

Course objectives: The course aims to make students gain knowledge are as follow:

1. The basics of digital forensics.
2. The cases which fall under the purview of digital crimes.
3. The types of digital crimes.
4. The elements involved in investigation of digital crimes.

PRACTICALS

1. To identify, seize and preserve digital evidence from crime scenes.
2. To detect deletions, obliterations and modifications of files using encase software.
3. To trace routes followed by e-mails and chats.
4. To identify the IP address of the sender of e-mails.
5. To demonstrate concealment techniques using cryptographic PGP.
6. To identify encrypted files.
7. To identify hidden files.
8. To 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.
12. Demonstrate the types of cryptographic algorithms are as follow:

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).



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III Year: V Semester (PRACTICAL)

Summer Training/ Internship

Code: BFS553

L	T	P	C
0	0	4	2

Course Learning Objectives: The overall objective of the industrial training is to expose the student to the work environment in the field of Forensic Science. In particular, the industrial training program will:

1. Enable the students to gain valuable practical experience, and test the students' career interests.
2. Provide the students with in depth knowledge about career fields.
3. Develop the students' job-related skills.
4. Enhance the students' Forensic Science knowledge acquired in class through lab experience.
5. Teach the students on how to deal with the society outside the university.
6. Provide the training organizations with a better assessment of the quality of future human resources, and suggest improvements.

Summer Training/ Internship

Summer Training/ Internships are an essential part of the academic curriculum. It is a bridges the widen gap between theoretical learning and practical exposure by giving students first-hand exposure to identify the inputs and outputs for different Industrial operations and processes performed at the workplace.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to

1. Analyze the different career prospects available in Forensic Science -related establishments
2. Understand the technology implemented in the manufacturing of products in real-world scenario
3. Understand the entrepreneurial skills required to establish Forensic Science -related manufacturing units
4. Understand the cost-cutting strategies adopted by manufacturing units



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B.Sc. (Honorswith Research)Forensic Science
Study Evaluation Scheme (As per NEP2020)
Effective from the session 2025-26

III Year: VI Semester

S No	Course Code	Course	L	T	P	Evaluation Scheme		Total	Credits	Course Type
						CIE	ESE			
Theory										
1	BFS601	Information Security Audit and Compliance	3	0	0	25	75	100	3	Major
2	BFS602	Crime Scene Investigation Techniques	3	0	0	25	75	100	3	Major
3	BFS603	Immunology and Forensic Serology	3	0	0	25	75	100	3	Major
4	BFS604	Forensic Odontology	3	0	0	25	75	100	3	Major
5	-----	General Elective	3	0	0	25	75	100	3	MD
6	-----	Discipline Specific Elective -2	3	0	0	25	75	100	3	AEC
7	BFS605	Analytical Ability and Digital Awareness	3	0	0	25	75	100	3	VAC
Practical										
8	BFS651	Information Security Audit and Compliance Lab	0	0	2	25	75	100	1	Major
9	BFS652	Crime Scene Investigation Techniques Lab	0	0	2	25	75	100	1	Major
10	BFS653	Forensic Serology and Forensic Odontology Lab	0	0	2	25	75	100	1	Major
Total			21	0	6	200	600	800	24	

B.Sc. in Forensic Science*

Evaluation Scheme, promotion scheme, grading system, and CGPA calculation adopted from CCFUP, by UGC 2022.

L	Lecture
T	Tutorial
P	Practical
CIE	Continuous Internal Evaluation
ESE	End Semester Examination
GE	Generic Elective
AEC	Ability Enhancement Course
SEC	Skill Enhancement Courses
DSE	Discipline Specific Elective
MD	Multidisciplinary
VAC	Value-added courses common for all UG

General Elective	
Course Code	Course Name
BFS631	Pharmacology
BFS632	Food Product Regulations
BFS633	Forensic Pathology
BFS634	Medico-Legal Procedures

Discipline Specific Elective -2	
Course Code	Course Name
BFS621	Forensic Geology
BFS622	Forensic Accounting
BFS623	Forensic Handwriting
BFS624	Forensic Dermatoglyphics
BFS625	Forensic Metabolomics

***3-year UG Degree:** Students who wish to undergo a 3-year UG program will be awarded UG Degree in the Major discipline after successful completion of three years, securing 120 credits and satisfying the minimum credit requirement as given in table 2.



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III Year: VI Semester (THEORY)

Information Security Audit and Compliance

Code: BFS601

L	T	P	C
3	0	0	3

Course objectives: The broad objective of the course is to make students aware about the importance of the Information Security Audit and Compliance. The specific objectives of the course are as follows:

1. To introduce the principles and frameworks of information security audits and regulatory compliance.
2. To equip students with tools and skills required for risk assessment, vulnerability management, and control testing.
3. To develop understanding of national and international standards like ISO 27001, NIST, PCI-DSS, and GDPR.
4. To foster skills in security documentation, audit trails, and compliance reporting.
5. To prepare students for careers in cybersecurity auditing, consulting, and governance.

UNIT I: Introduction to Information Security Auditing

What is Information Security Audit? Types: Internal, External, Technical, Compliance, Forensic. Audit cycle: planning, execution, reporting, follow-up. Role of auditors and audit charter. Security governance and GRC (Governance, Risk, Compliance)

UNIT II: Risk Management and Control Frameworks

Risk identification, analysis, and mitigation. Risk Assessment Matrix. Control design and implementation. ISO/IEC 27001:2013 controls and annexures. Introduction to COBIT, ITIL, and NIST frameworks

UNIT III: Legal, Regulatory, and Compliance Requirements

Indian IT Act 2000 & 2008 amendments. GDPR, HIPAA, PCI-DSS, SOX: key features. Data protection, breach notification, and privacy requirements. Organizational compliance policies and procedures. Penalties and enforcement

UNIT IV: Technical and Physical Security Controls

Network security and endpoint protection, Access control and authentication policies. Audit logs and SIEM tools. Backup and disaster recovery audit. Physical and environmental controls (biometrics, CCTV, entry logs)

UNIT V: Audit Execution, Reporting & Case Studies

Preparing audit plans and checklists, Audit evidence collection and validation, Audit report writing (NCs, observations, CAPA). Case studies: bank, healthcare, and cloud service audits Emerging trends: zero trust, cloud compliance, AI auditing

SUGGESTED READING

1. James DeLuccia IV – IT Compliance and Controls: Best Practices for Implementation
2. Debra S. Herrmann – Complete Guide to Security and Privacy Metrics
3. Krishna B. – Cyber Laws and Information Technology Regulation, PHI



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2. David Kim, Michael Solomon – Fundamentals of Information Systems Security, Jones & Bartlett
3. Alan Calder – IT Governance: An International Guide to Data Security and ISO27001/ISO27002
4. ISO/IEC 27001 & 27002: Latest versions
5. NIST SP 800-53, NIST Cybersecurity Framework
6. OWASP and CERT guides for secure coding & audits

Course Learning Outcome (CLO): Upon successful completion of this course the student will:

1. Understand the principles, scope, and types of security audits.
2. Interpret and apply key compliance standards and data protection laws.
3. Conduct basic IT security audits using appropriate checklists and tools.
4. Evaluate and report vulnerabilities and risk factors in an organization.
5. Document audit findings and recommend corrective and preventive actions (CAPA).



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Department of Forensic Science

III Year: VI Semester (THEORY)

Crime Scene Investigation Techniques

Code: BFS602

L	T	P	C
3	0	0	3

Course objectives: The broad objective of the course is to make students aware about the importance and significance of the diverse crime scene investigation and their techniques used to study. The specific objectives of the course are as follows:

1. Provide the students necessary foundation to understand the various steps of crime scene investigation.
2. Students shall get a detailed understanding of handling of evidences.
3. Additionally, case studies of various cases shall be reviewed to ensure the student grasps
4. The objectives being reviewed and to enhance the learning environment.

UNIT I: Introduction to Crime Scene

Crime scene: Definition; Types of crime scenes: Primary, Secondary, Indoor, Outdoor, based on manner of crime: homicide, suicide, accidental; Actions of first responding officer: emergency care, secure and control, Statements of victim, witness, suspects, databases and records, officer safety, release scene to appropriate authorities. Types of evidence found in the crime scene: physical evidence, biological evidence, digital evidence, individual evidence, class evidence. The evaluation of 5Ws (who?, what?, when?, where?, why?) and 1H (how). Role of different agencies involved in crime scene management: Police, Forensic Science Laboratories, Medico legal experts, Judicial officers.

UNIT II: Crime Scene Investigation

Securing the crime scene; Evaluating the crime scene; Preliminary walk-through and documentation of the crime scene; Search and seizure of the crime scene Crime scene search patterns: strip method, grid method, zone/quadrant method, spiral method (inward and outward), wheel, and random; Documenting the crime scene: Photography of the crime scene: Wide range, mid-range and close up photography; Sketching: Rough and final sketch (Triangulation, Baseline, and polar coordinate methods), Videography, 3D Crime Scene Mapping, contemporaneous notes. Identifying and listing evidence along with their evidentiary value.

UNIT III: Collection and preservation of evidence

Collection and preservation of evidence along with control samples and standards: blood, urine, saliva, semen, tissue, hair, soil, paint, glass, bullet, cartridge case, clothing, weapons (knife, firearm), documents, drugs, fingerprints, tool marks, explosive material, bite marks; General safety considerations while handling evidence in the crime scene; Forwarding evidence to the Forensic Science Laboratory; Chain of custody.

UNIT IV: Trace Evidences

Location, Collection & Evaluation of Various Types of Trace Evidences: Paint, Soil, Glass, Detective dyes, GSR. **Tool Marks:** Classification of Tool Marks. Forensic Importance of Tool Marks. Collection, Preservation and Matching of Tool Marks.

UNIT V: Forensic Photography



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Photography: Basic Principles and Techniques, Exposing, Developing and Printing, Modern Developments in Photography, Digital Photography, Videography/High speed Videography, Crime Scene and Laboratory Photography. **Advances in Crime Scene Investigation** 3-D Scanning of the Scene, Introduction to Biosensors, Reconstruction of the Scene. Portable Devices for Crime Investigation.

SUGGESTED READING

1. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA.
4. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009 The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.

Course Learning Outcome (CLO): At the end of the course the students should be able to understand:

1. Learn the basic concepts of crime scene.
2. To Study of types of evidences found in crime scenes.
3. To understand the safety considerations while handling evidences.
4. To acquire knowledge on agencies involved in crime detection and investigation.
5. To understand the technical and their role in forensic science.



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III Year: VI Semester (THEORY)
Immunology and Forensic Serology
Code: BFS603

L	T	P	C
3	0	0	3

Course objectives: The Course aims to provide students; students will be able to;

1. To provide a fundamental understanding of immune system components, mechanisms, and functions.
2. To explain the principles and techniques used in forensic serological analysis.
3. To introduce antigen-antibody interactions and their applications in forensic science.
4. To train students in identifying biological evidence and body fluids at crime scenes.
5. To understand the role of immunological and serological tests in forensic identification and casework.

UNIT I: Basics of Immunology

Innate and adaptive immunity. Immune organs and cells (T cells, B cells, macrophages, NK cells). Antigens and antibodies: types, structure, and function. Immunoglobulin classes (IgG, IgM, IgA, etc.). Humoral and cell-mediated immunity

UNIT II: Antigen-Antibody Reactions and Immunological Assays

Principles of antigen-antibody interaction. Precipitation and agglutination reactions. Complement fixation test. Radioimmunoassay (RIA) and ELISA. Immunodiffusion and immunoelectrophoresis

UNIT III: Forensic Serology: Blood Analysis

Composition and characteristics of blood. Blood typing (ABO and Rh systems). Presumptive and confirmatory tests for blood. Species origin determination. Bloodstain pattern analysis (introduction only)

UNIT IV: Analysis of Other Body Fluids

Identification of semen: Acid phosphatase, sperm detection. Identification of saliva: Amylase test. Detection of urine, sweat, vaginal secretions. Detection of menstrual blood. Collection and preservation of biological evidence

UNIT V: Forensic Applications and Casework

Forensic significance of immunological and serological techniques. Paternity and kinship analysis using serological markers. Role of HLA typing in identification. Legal aspects and admissibility of serological evidence. Recent advancements: biosensors, multiplex assays.

SUGGESTED READING

1. **Kind SS & Overman LE.** *Science Against Crime*, Doubleday
2. **Kuby J., Kindt TJ, Osborne BA, Goldsby RA.** *Immunology*, W.H. Freeman & Co.
3. **Chatterjee CC.** *Human Physiology (Vol II: Immunology section)*



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4. **Saferstein R.** *Criminalistics: An Introduction to Forensic Science*, Pearson Education
5. **James SH, Nordby JJ, Bell S.** *Forensic Science: An Introduction to Scientific and Investigative Techniques*, CRC Press
6. **Rao DN.** *Forensic Serology: Laboratory Manual*, National Institute of Criminology and Forensic Science (NICFS), India
7. **Tortora GJ, Funke BR, Case CL.** *Microbiology: An Introduction*, Pearson

Course Learning Outcome (CLO): Upon successful completion of this course the student will:

1. Describe the components and functioning of the human immune system.
2. Explain the principles of antigen-antibody reactions and immune responses.
3. Identify and analyze blood, semen, saliva, and other body fluids using serological techniques.
4. Apply immunological assays (e.g., ELISA) in forensic investigations.
5. Interpret serological evidence in the context of forensic case studies and courtroom requirements.



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III Year: VI Semester (THEORY)

Forensic Odontology

Code: BFS604

L	T	P	C
3	0	0	3

Course objectives: The specific objectives of the course are as follows:

1. To introduce students to the principles and scope of forensic odontology.
2. To enable understanding of human identification through dental records.
3. To develop skills in age estimation, bite mark analysis, and disaster victim identification.
4. To appreciate the role of dentists in medico-legal investigations.
5. To cultivate ethical and legal awareness in forensic practice.

UNIT I: Introduction to Forensic Odontology

Definition, scope, and history. Role of forensic odontologist in civil and criminal cases. Identification methods in forensic science, Legal significance of forensic dentistry. Overview of Indian and international legal systems related to forensic odontology.

UNIT II: Human Identification and Dental Profiling

Human dentition and uniqueness, Comparative dental identification, Dental anomalies and restorations, Dental charting and coding systems (FDI, Palmer), DNA analysis from dental tissues Sex determination using odontometric and skull parameters.

UNIT III: Age Estimation Techniques

Age estimation in children: Tooth eruption, Demirjian's method, Age estimation in adults: Gustafson's and Kvaal methods, Radiographic methods (pulp/tooth ratio). Third molar development and forensic relevance.

UNIT IV: Bite Mark Analysis and Abuse Detection

Nature and classification of bite marks, Collection and preservation of bite mark evidence, Bite mark analysis techniques, Role in child abuse and domestic violence cases, Pattern analysis in forensic cases

UNIT V: Mass Disaster Management and Legal Aspects

Role of forensic odontologist in DVI (Disaster Victim Identification), Interdisciplinary approach and protocols, Maintenance and importance of ante-mortem/post-mortem records, Courtroom testimony and report writing, Ethics, limitations, and future directions in forensic odontology.

SUGGESTED READING

1. Bowers CM, Bell GL. Manual of Forensic Odontology. 5th Edition, CRC Press, 2012.
2. Pretty IA, Sweet D. Forensic Dentistry. Elsevier, 2001.
3. Brkic H, Lessig R. Forensic Odontology: Principles and Practice. Springer, 2022.
4. Cameriere R, De Luca S. Age Estimation: A Multidisciplinary Approach. CRC Press, 2020.
5. Senn DR, Weems RA. Forensic Dentistry. 2nd Edition, CRC Press, 2013.
6. Guidelines by Interpol DVI Protocol and IAFO (Indian Association of Forensic Odontology).

Course Learning Outcome (CLO): Upon successful completion of this course the student will:



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1. Explain the scope, history, and importance of forensic odontology in legal investigations.
2. Apply dental knowledge in age, sex, and identity determination.
3. Analyze bite mark evidence and assess its forensic value.
4. Understand procedures for handling and identifying victims in mass disasters.
5. Interpret and maintain dental records in accordance with legal standards.
6. Discuss ethical and legal implications involved in forensic odontology.



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III Year: VI Semester (THEORY)

General Elective

Pharmacology

Code: BFS631

L	T	P	C
3	0	0	3

Course objectives: The main objective of this course is to:

1. To know about the basic concepts and kinetics of the drugs
2. To know about the drug effects and interactions of commonly used drugs like NSAIDS, narcotics, sedatives and hypnotics.

UNIT I: Basic Concepts of Pharmacology

Introduction, Drug Receptor and Pharmacodynamics, Development and Regulation of drugs

UNIT II: Pharmacokinetics

Drug metabolism, Adverse drug reactions and pharmacogenetics, Drug concentration and pharmacological response, Post mortem redistribution.

UNIT III: Drugs

Drug effects, Drug Interaction, Narcotic Drugs and Psychotropic Substance, Schedule Drugs, International Classification, National Legislation, Nonscheduled, Drugs, Designer Drugs analysis, Drugs of abuse, Doping Drugs analysis

UNIT IV: Analgesics (Opiates)

Opiate Alkaloids, Identification, Quantification, Comparison, Analysis and Profiling by Immunoassays various chemical and instrumental techniques, Heroin and associated Illicit Opiate formulation. Non-opioid Analgesics Paracetamol and Acetylsalicylic Acid analysis Cannabis Introduction, Seized drug Identification of Herbal material, Identification of other materials like Hash and Hash Oil by Immunoassays, various chemical and instrumental techniques, Profiling of Cannabis Hallucinogens, LSD (Lysergic Acid diethylamide), Mescaline, Psilocybin, Phencyclidine: Analysis by various chemical and instrumental techniques

UNIT V: Stimulants

Cocaine: Identification of plant Material (alkaloids) by Immunoassays, Analysis by various chemical and instrumental techniques, Illicit Cocaine Analysis Amphetamines, ethamphetamines: Introduction, Extraction, Derivatization, Analysis by various techniques, Metabolic Profile, Impurity Profiling, Source Differentiation. Sedatives and hypnotics Barbiturates, Introduction, Classification, Analysis by various chemical and instrumental techniques, Benzodiazepines: Introduction and analysis of (Diazepam-Flunitrazepam-Metazepam- Nitrazepam-Meprobate-Methaqualone-Chloral Hydrate Zolpidem) by various chemical and instrumental techniques, Impurity profiling

Suggested Readings:

1. Klaassen, C. D., Casarett and Doull's Toxicology: The Basic Science of Poisons, 5th ed, McGraw-Hill, 1995.



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2. Moffat, A.C.: Osselton, D. M. Widdop, B: Clarke's Analysis of Drugs and Poisons in Pharmaceuticals, body fluids and postmortem material, 3rd ed., Pharmaceutical Press 2004.
3. Bogusz, M. J.: Hand Book of Analytical Separations, Vol. 2: Forensic Science, 1st ed., Elsevier Science, 2000.
4. Siegel, J.A., Saukko, P. J., Knupfer, G.,: Encyclopedia of Forensic Sciences (Vol3), Academic Press, 2000.
5. Rang, P.H., Dale, M.M., Ritter, M.J.: Pharmacology, 4th ed., Harcourt/Churchill Livingstone, 2000.
6. Paranjape, H.M., Bothara, G.K., Jain, M.M.: Fundamentals of Pharmacology, 1st ed., Nirali Prakashan, 1990

Course Learning Outcome (CLO): Successful students will be able to:

1. Students will develop an ability of Basic Concepts of Pharmacology and Pharmacokinetics
2. Students will develop an ability to know about Drugs and their effect and interaction. As well as Analgesics, Stimulants, Sedatives and hypnotics



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III Year: VI Semester (THEORY)

General Elective

Food Product Regulations

Code: BFS632

L	T	P	C
3	0	0	3

Course objectives: The main objective of this course is to:

1. To introduce students to national and international food regulatory frameworks.
2. To understand the legal and scientific basis of food standards, labeling, and safety.
3. To provide knowledge of regulatory compliance, food import/export laws, and enforcement procedures.
4. To foster awareness of consumer rights and ethical food practices.
5. To develop capacity for critical evaluation of regulatory issues in food product development and marketing.

Unit I: Introduction to Food Product Regulations

History and need for food laws and standards. Evolution of food regulation in India: PFA, FPO, MFPO to FSSAI. Overview of international regulatory bodies: Codex Alimentarius, WHO, FAO, WTO, EFSA, FDA (US), EU. Principles of risk analysis and food control systems

Unit II: National Food Regulatory Framework (FSSAI)

Structure and functions of FSSAI. Key regulations under FSS Act, 2006. Licensing and registration of food businesses. Roles of state and central authorities in enforcement. Recent amendments and updates to Indian food laws

Unit III: Labelling, Claims, and Product Approvals

General and nutritional labelling regulations (FSSAI Labelling Regulations 2020). Health claims, nutrient claims, RDA limits Front-of-pack labelling, allergen declaration. Novel food and proprietary food approvals. Product categorization and classification

Unit IV: Food Additives, Contaminants & Safety Standards

Permitted additives, preservatives, colours, and flavourings. Contaminants, residues, and heavy metal limits. Packaging and labelling standards. Hygiene and GMP/GHP standards. Food recall procedures and consumer grievance redressal

Unit V: Global Trade, Import/Export Laws and Ethics

Sanitary and Phytosanitary (SPS) Agreement. WTO & Codex-based international harmonization. Import/export documentation and clearance. Export Inspection Council (EIC) & APEDA. Ethics in food business, corporate responsibility, food fraud

Suggesting Readings:

1. Food Safety and Standards Act, 2006 (Including latest rules and regulations) – FSSAI, Govt. of India
2. FSSAI Manual of Food Laws and Standards, 2023



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3. Codex Alimentarius Commission **Standards (FAO/WHO)** – www.fao.org
4. Regulatory Affairs for Food Professionals by **James G. Speight**, CRC Press
5. **Nutrition Labeling Handbook** by Ralph Shapiro, CRC Press
6. **Food Law in the United States** by Michael T. Roberts, Cambridge University Press
7. **Indian Food Legislation and Control** – National Institute of Nutrition (NIN) publications

Course Learning Outcome (CLO): Successful students will be able to:

1. Understand the framework and evolution of food product regulations in India and globally.
2. Interpret labeling requirements and nutritional declarations according to regulatory guidelines.
3. Identify regulatory requirements for different categories of food products (e.g., functional foods, supplements, infant food).
4. Analyze compliance standards related to food safety, additives, contaminants, and packaging.
5. Demonstrate knowledge of food import/export laws, registration, licensing, and legal enforcement procedures.



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III Year: VI Semester (THEORY)

General Elective

Forensic Pathology

Code: BFS633

L	T	P	C
3	0	0	3

Course objectives: The main objective of this course is to:

1. To provide foundational knowledge of general pathology, including cell injury, inflammation, tissue repair, hemodynamic disorders, neoplasia, and the effects of environmental and nutritional factors.
2. To familiarize students with the etiology, classification, laboratory findings, and diagnostic approaches to common hematological disorders such as anemia, leukemia, and bleeding disorders.
3. To train students in transfusion medicine practices including donor selection, blood grouping, Rh typing, cross-matching, transfusion safety, and interpretation of reactions.
4. To equip students with practical knowledge in blood sample collection, hematological techniques, interpretation of automated results, and the principles of histopathology specimen handling.
5. To develop competency in clinical pathology techniques, especially urinalysis and analysis of various body fluids, along with understanding of quality control and biosafety in diagnostic laboratories.

Unit I: pathology-Introduction- & scope of pathology

Cell injury and Cellular adaptations- Normal cell, Cell injury- types, etiology, morphology, Cell death- autolysis, necrosis, apoptosis, Cellular adaptations- atrophy, hypertrophy, hyperplasia, metaplasia. Inflammation-Introduction, acute inflammation-vascular events, cellular events, chemical mediators, chronic inflammation- general features, granulomatous inflammation, tuberculosis. Healing and repair- Definition, different phases of healing, factors influencing wound healing, fracture healing. Haemodynamic disorders- Edema, hyperemia, congestion, hemorrhage, embolism, thrombosis, infarction. Neoplasia- definition, nomenclature, features of benign and malignant tumors, spread of tumors, dysplasia, carcinoma in situ, precancerous lesions. Environmental and nutritional pathology- smoking, obesity and vitamin deficiencies.

Unit II: Hematological Disorders

Introduction and hematopoiesis. Anemia-introduction and classification (morphological and etiological). Iron deficiency anemia: distribution of body iron, iron absorption, causes of iron deficiency, lab findings, megaloblastic anemia: causes, lab findings. Hemolytic anemias: definition. Causes, classification, and lab findings. WBC disorders- quantitative disorders, leukemia-introduction, Pancytopenia. Bleeding disorders- Introduction, Classification, causes of inherited and acquired bleeding disorders, thrombocytopenia, DIC, laboratory findings.

Basic Hematological Techniques: Characteristics of good technician, Blood collection- methods (capillary blood, venipuncture, arterial puncture) complications, patient after care. Anticoagulants, transport of the specimen, preservation, effects of storage, separation of serum and plasma, universal precautions. Complete hemogram- CBC, peripheral smear, BT, CT, PT, APTT, ESR, PCV. Automation in hematology-principles of autoanalyzer -3 part, 5 part and six part analysers and coagulometer-interpretation of autoanalyzer results. Disposal of the waste in the laboratory.



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Unit III: Transfusion Medicine

Selection of donor, blood grouping, Rh typing, cross matching, and storage. Transfusion-transmitted diseases, transfusion reactions, components- types, indications. Examination of cerebrospinal fluid- physical examination, chemical examination, microscopic examination. Examination of body fluids (pleural, pericardial and peritoneal), physical examination, chemical examination, microscopic examination. Sputum examination.

Unit IV: Blood collection and histopathology

Blood collection- methods (capillary blood, venipuncture, arterial puncture) complications, patient after care. Handling and storage of samples in hematology Interpretation of autoanalyzer results- complete blood count and erythrocyte Indices- MCV, MCH, MCHC. Reticulocyte staining and counting. Staining of peripheral smear and Differential leucocyte count. Quality assurance in hematology. Introduction and basics of histopathology –Handling, storage, and processing of specimens.

Unit V: Clinical Pathology

Introduction to clinical pathology and Urinalysis- collection. Preservatives, physical, chemical examination and microscopy. Physical examination; volume, color, odor, appearance, specific gravity and pH. Chemical examination; strip method- protein- heat and acetic acid test, sulfosalicylic acid method, reducing sugar- benedicts test, ketone bodies- rothas test, bile pigments- fouchet method, bile salt- hays method, blood- benzidine test, urobilinogen and porphobilinogen-ehrllich aldehyde and schwartz test, bence jones protein, microscopy. Handling and storage of samples in cytology and clinical pathology. Quality assurance in cytology and clinical pathology

Suggesting Readings:

1. Basic Pathology Robbins Saunders, an imprint of Elsevier Inc., Philadelphia, USA.
2. Text book of Pathology Harsha Mmohan Jaypee Brothers, New Delhi.
3. Practical Pathology P. Chakraborty, Gargi Chakarborty New Central book agency, Kolkata.
4. Text book of Haematology Dr Tejinder Singh Arya Publications, Sirmour (H P).

Course Learning Outcome (CLO): Successful students will be able to:

1. Demonstrate the acquisition of comprehensive knowledge of cell pathology and repair
2. Demonstrate the acquisition of comprehensive knowledge of pathogenesis, morphology and complications of hematological diseases of the body.
3. Perform and analyse basic hematology techniques.
4. Acquisition of Knowledge of workflow and to perform basic investigations in Transfusion medicine and clinical pathology.



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III Year: VI Semester (THEORY)
General Elective
Medico-Legal Procedures
Code: BFS634

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are as follows:

1. To introduce the principles and scope of medico-legal procedures in healthcare and forensic practice.
2. To provide foundational knowledge of legal documentation, autopsy protocols, and forensic responsibilities of medical professionals.
3. To understand the roles and responsibilities of medical practitioners in judicial investigations.
4. To equip students with the ability to handle cases involving injury, sexual assault, poisoning, and death investigation.
5. To develop skills for ethical conduct, informed consent, and medico-legal reporting.

UNIT I: Introduction to Medico-Legal Framework

Definition and scope of medico-legal procedures. Role of medical professionals in the legal system. Legal definitions: injury, death, consent, negligence. Indian Penal Code (IPC) and Criminal Procedure Code (CrPC) relevant to medical practice. Courts of law, types of evidence, expert witness

UNIT II: Medical Ethics and Legal Responsibilities

Informed consent and refusal of treatment. Medical negligence and malpractice. Professional misconduct and MCI/NMC regulations. Rights of patients and healthcare providers. Documentation and confidentiality in clinical and forensic settings.

UNIT III: Medico-Legal Documentation and Reporting

Injury reporting and wound certificate. Medicolegal case registration and examination. Death certificate, postmortem certificate, and dying declaration. Report writing formats and chain of custody of evidence. Role in police and judicial inquiries

UNIT IV: Forensic Autopsy and Postmortem Examination

Objectives and procedures of autopsy. Types of death: natural, accidental, suicidal, homicidal. Time since death estimation. Examination of internal organs, toxicological analysis. Identification of unknown bodies

UNIT V: Special Medico-Legal Cases and Court Testimony

Sexual assault and POCSO Act protocols. Poisoning, burns, and firearm injury investigations. Medical examination of victims and accused. Role in mass disaster and custodial death investigations. Courtroom testimony: demeanor, deposition, and cross-examination

Suggested Readings:



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1. **Reddy KSN.** *The Essentials of Forensic Medicine and Toxicology*, 35th Ed., Jaypee Brothers
2. **Modi's Medical Jurisprudence and Toxicology**, 26th Ed., LexisNexis
3. **Parikh's Textbook of Medical Jurisprudence, Forensic Medicine and Toxicology**, CBS Publishers
4. **Baswanthappa BT.** *Forensic Nursing*, Jaypee Publishers
5. **Murthy KK.** *Medical Ethics and Law*, Paras Medical Books
6. **National Guidelines for Examination of Sexual Assault Survivors**, Ministry of Health and Family Welfare, Govt. of India
7. **Indian Penal Code (IPC) and Criminal Procedure Code (CrPC)** – Bare Acts
8. *Journal of Indian Academy of Forensic Medicine (JIAFM)*
9. WHO and NMC Guidelines on medico-legal practice and patient rights

Course Learning Outcome (CLO): Upon successful completion of this course the student will:

1. Explain the legal duties and responsibilities of healthcare professionals in medico-legal cases.
2. Perform and interpret medico-legal documentation including injury reports, death certificates, and consent forms.
3. Understand and apply autopsy procedures and principles of forensic pathology.
4. Identify and evaluate evidence in cases of assault, poisoning, and unnatural deaths.
5. Discuss ethical principles, patient rights, and professional conduct in medico-legal practice.



Mahayogi Gorakhnath University Gorakhpur
Faculty of Health and Life Sciences
Department of Forensic Science

III Year: VI Semester (THEORY)
Discipline Specific Elective -2
Forensic Geology
Code: BFS621

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are as follows:

1. To introduce students to the principles and applications of geology in forensic investigations.
2. To develop understanding of soil, minerals, and sediment evidence in crime scene analysis.
3. To provide practical knowledge of sample collection, preservation, and analysis techniques.
4. To train students in interpreting geological trace evidence and linking it to criminal cases.
5. To familiarize students with legal procedures involving geological evidence and expert testimony.

UNIT I: Introduction to Forensic Geology

Definition, scope, and history of forensic geology. Branches of geology relevant to forensic science. Role of forensic geologists in criminal investigations. Overview of geological materials as trace evidence. Famous case studies involving geological evidence

UNIT II: Soil and Sediment Analysis in Forensics

Soil formation and classification. Physical, chemical, and biological properties of soil. Techniques for soil sampling and preservation. Forensic significance of pollen, spores, and microfossils. Sediment fingerprinting and comparison

UNIT III: Minerals, Rocks, and Trace Geological Evidence

Classification of rocks and minerals. Optical, X-ray, and SEM analysis techniques. Identification of geological particles in trace evidence. Paint chips, dust, gravel, and sand in forensic reconstruction. Casework involving rock and mineral trace analysis

UNIT IV: Analytical Techniques in Forensic Geology

Microscopy (polarizing, electron). Spectroscopic methods: XRD, XRF, FTIR, ICP-MS. Geochemical and isotopic fingerprinting. GIS and remote sensing applications in forensic geology. Data interpretation and evidence reporting

UNIT V: Legal Aspects and Courtroom Applications

Collection and chain of custody for geological evidence. Standards for admissibility in court (Daubert/Frye standards). Role of geologists as expert witnesses. Report writing and presenting geological evidence. Ethical considerations in forensic geology

Suggested Readings:

1. **Ruffell A. & McKinley J.** *Forensic Geoscience: Principles, Techniques and Applications*, Wiley-Blackwell, 2008



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2. **Pye K. & Croft D.J.** *Forensic Geoscience: Applications of Geology, Geomorphology and Geophysics to Criminal Investigations*, Geological Society Special Publication
3. **Cox R. & Hunter J.** *Forensic Geology: Earth Sciences and Criminal Investigation*, Springer, 2019
4. **Murray RC.** *Evidence from the Earth: Forensic Geology and Criminal Investigation*, Mountain Press, 2004
5. **Aitken C.G.G. & Kobilinsky L.** *Handbook of Forensic Science*, Routledge, relevant chapters
6. **US Department of Justice:** *Geological Evidence: Forensic Techniques Manual* (online resources)
7. **Journals:** *Forensic Science International, Journal of Forensic Sciences, Science & Justice*

Course Learning Outcome (CLO): Upon successful completion of this course the student will:

1. Explain the significance and scope of forensic geology in criminal and civil investigations.
2. Identify and classify geological materials such as soil, minerals, rocks, and sediments from crime scenes.
3. Apply scientific techniques for analysis of geological trace evidence.
4. Interpret and compare geological evidence to establish linkage between suspect, scene, and victim.
5. Understand the legal admissibility of geological evidence and perform expert witness duties.



Mahayogi Gorakhnath University Gorakhpur
Faculty of Health and Life Sciences
Department of Forensic Science

III Year: VI Semester (THEORY)
Discipline Specific Elective -2
Forensic Accounting
Code: BFS622

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are as follows:

1. Understand both the pervasiveness and the causes of fraud and white-collar crime in our society
2. Examine the types of fraud and fraud schemes that affect business enterprises,
3. Explore methods of fraud detection and prevention, and increase their ability to recognize potential fraudulent situations.

UNIT I: Introduction to Forensic Accounting

Signs of Fraud, Looking for Suspects – Evaluating Fraud – Tips, Confronting Suspects – Skills of a Fraud Investigator – Differences between Audits and Investigations Conducting a Fraud Investigation Beginning the Investigation: Assessing the Engagement, Making Recommendation, Budgeting and Cost Control, Engagement Letters. Managing the Case: Importance of Credentials, Management and Supervision of Staff, Work Programmes and Checklist, Document Management, Preserving Evidence, File Maintenance, Investigative Software

UNIT II: Introduction to Fraud Examination

Professional Standards – Searching for Fraud: Analytical Review, Key Financial Ratios, Write-offs, Adjustments and Miscellaneous, Manual Disbursements. Looking for Frauds in little things – Sources of Information: Who Acquires Information, Internal Records, Private Records, Internet and Search Engines. Investigative Techniques: Corporate Background Checks, Individual Background Checks, Searching for Friends, Family and Associates, Surveillance, Digital Data Analysis, Computer Forensics, Interviewing Witnesses and Suspects, Confirmation with Customers and Vendors

UNIT III: Investigation of Asset Misappropriation Schemes I

Cash Receipts Schemes, Disbursement Schemes, Noncash Schemes– Investigation of Financial Statement Fraud: Revenue Overstatement, Channel Stuffing, Round-Tripping, Asset Overstatement, Liability and Expense Understatement, Reserve Manipulation. Misrepresentation or Omission of Information, Improper Recording of Mergers and Acquisitions, Off-Balance-Sheet Items.

UNIT IV: Investigation of Asset Misappropriation Schemes II

Accounting: Involves Judgements and Estimates, Earnings Management. Investigation of Corruption Schemes: Bribes, Kickbacks, Extortion and Conflict of Interest, Related Party Transactions, Money Laundering, Foreign Corrupt Practices Act. Prevention and Detection – Investigation of External Fraud Schemes: Corporate Espionage, Investment Schemes, Pyramid or Ponzi Schemes, Securities Fraud, Hidden Income or Assets – Insurance Fraud – Bankruptcy Fraud

UNIT V: Reporting and Litigation

Background Information, Investigation Procedures, Opinions, Attachments, Draft Reports, Unfavorable Opinions. Follow-up to the Fraud Investigator's Work – Being an Expert Witness, Preparing for Testimony, Deposition Testimony, Trial Testimony. Other Issues: Moving forward as a



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Company, Preventing Future Frauds, Marketing a Fraud Investigation Practice, Competing with Other Firms, Conducting a Global Investigation, Professional Liability Issues, Reducing Fraud with Investigation

Suggested Readings:

1. Joshi A.: Students' Handbook on Forensic Accounting, pub Fraudexpress Media 2012
2. Padmarathi C.: Forensic Accounting and Fraud Investigation, pub ICFAI
3. Silverstone H and Sheetz, M.: Forensic Accounting and Fraud Investigation for Non-Experts
4. Tommie W. Singleton, Singleton A. J., Bologna G. Jack, Lindquist R. J.: Fraud Auditing and Forensic Accounting, John Wiley & Sons, 3rd ed. , 2006
5. Manning G.A.: Financial Investigation and Forensic Accounting, CRC Press, 1999
6. Kranacher Mary-Jo, Riley R., Joseph T.: Forensic Accounting and Fraud Examination, John Wiley & Sons, 2010
7. Woodget, B.W. and Cooper, D.: Samples and Standards, ACOL Series, Willey 1987
8. Ross, J.: Total Quality Management, Vanity Book, Intl, 1995
9. Dux, J.P.: Hand Book of Quality Assurance for Anal. Chem. Laboratory, Van Nostrand, 1986

Course Learning Outcome (CLO): Upon successful completion of this course the student will:

1. Understand the forensic accounting and its application
2. Apply the fraud examination techniques to identify fraud and other irregularities;
3. Analyse financial statement fraud and interpret evidentiary material
4. Apply the analytical techniques and principles in investigation of different types of corruption and the prevention of fraud.
5. complete fraud examinations that meet judicial standards of investigation;
6. Document and effectively communicate the results of forensic analysis related to valuations, financial reporting fraud and other litigation issues.



Mahayogi Gorakhnath University Gorakhpur
Faculty of Health and Life Sciences
Department of Forensic Science

III Year: VI Semester (THEORY)

Vocational Elective
Forensic Handwriting
Code: BFS623

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are as follows:

1. Developing an understanding and appreciation for the scope of Handwriting
2. Identification and Examination.
3. Develop an understanding on handwriting and their characteristics, principles of identification.
4. Give brief description on various methods of their detection and examination.
5. Develop comprehensive knowledge on type written documents, common styles and their examination.

UNIT-I: Handwriting

Handwriting, Class and Individual characteristics, Natural variations, Principles of handwriting, identification, External and internal factors which influence handwriting, ethnic and gender variability of handwriting, various types of forgeries and their detection.

UNIT-II: Handwriting Identification

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

UNIT-III: Handwriting Examination

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

UNIT IV: Signature Examination

examination of signatures – characteristics of genuine and forged signatures, identification of forger, identification of writer of anonymous letters and application of Forensic Stylistics/Linguistics in the identification of writer, examination of built-up documents and determination of sequence of strokes.

UNIT-V: Handwriting Recognition

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

Suggested Readings:

1. Albert, S. Osborn, Questioned Documents, Second Ed., Universal Law Publishing, Delhi, 1998.
2. Charles, C. Thomas, I.S.Q.D. Identification System for Questioned Documents, Billy Prior Bates, Springfield, Illinois, USA, 1971.



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3. Kelly, J. S. Lindblom, B. S. (2006). *Science, Handwriting Examination and the Courts. Scientific Examinations of Questioned Documents*, 2nd edition, CRC Press, Taylor & Francis group.
4. Huber, A. R. Headrick, A. M. (1999). *The Discrimination and Identification of writing. Handwriting Identification Facts and Fundamentals*, CRC Press, Boca Raton London.
5. James, S. H. And Nordby, J. J. (Eds), *Forensic Science; An Introduction to Scientific and Investigative Techniques*, CRC Press, London, 2003.

Course Learning Outcome (CLO): Upon successful completion of this course the student will:

1. Demonstrate the acquisition of comprehensive knowledge about individualization development in hand writing.
2. Demonstrate the skills of identification of Genuine Indian currency notes
3. Demonstrate the skills of evidence presentation and analysis of electronic documents.



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III Year: VI Semester (THEORY)
Discipline Specific Elective -2
Forensic Dermatoglyphics
Code: BFS624

Course Objectives: The objectives of the course are as follows:

L	T	P	C
3	0	0	3

1. The fundamental principles on which the science of fingerprinting is based.
2. Fingerprints are the most infallible means of identification.
3. The world's first fingerprint bureau was established in India.
4. The method of classifying criminal record by fingerprints was worked out in India, and by Indians.
5. The physical and chemical techniques of fingerprints was worked out in India, and evidence.
6. The significance of foot, palm, ear and lip prints.

UNIT-I : INTRODUCTION AND HISTORY

Introduction and history with special reference to India. Biological basis of fingerprints. formation of ridges. Fundamentals of fingerprinting. Types of fingerprints.

UNIT-II: BASICS OF FINGERPRINTING

Fingerprint patterns. Fingerprint characters/ minutiae. Plain and rolled fingerprints. Classification and cataloguing of fingerprint record. Automated fingerprint Identification system. Significance of poroscopy and edgeoscopy.

UNIT-III: PHYSICAL AND CHEMICAL METHOD

Latent fingerprints detection by physical and chemical techniques. Mechanism of detection of fingerprints by different developing reagents. Application of light sources in fingerprint detection. Fingerprint the deceased. Developing fingerprints on gloves.

UNIT –IV: POROSCOPY

Significance of poroscopy and edgeoscopy.

UNIT-V OTHER IMPRESSIONS

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

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



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Course Learning Outcome (CLO): Upon successful completion of this course the student will:

1. Demonstrate the ability to analyse the fundamental principles and biological basis of fingerprints
2. Demonstrate the acquisition of knowledge and skills about identification and various techniques of development of finger prints on crime scene
3. Able to interpret various method of creation of criminal identity



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Faculty of Health and Life Sciences
Department of Forensic Science

III Year: VI Semester (THEORY)
Discipline Specific Elective -2
Forensic Metabolomics
Code: BFS625

Course Objectives: The objectives of the course are as follows:

L	T	P	C
3	0	0	3



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III Year: VI Semester (THEORY)
Analytic Ability and Digital Awareness
Code: BFS605

L	T	P	C
3	0	0	3

Course objectives: The objectives of the course are as follows:

1. To teach analogy, number system, set theory and its applications, number system and puzzles.
2. Understand the basics of Syllogism, figure problems, and critical and analytical reasoning.
3. Students will learn with word processing applications and worksheets.
4. Students will understand the basics of web surfing and cyber security.

UNIT I: Analytic ability

Alphabet test, Analogy, Arithmetic Reasoning, Blood relations, Coding and Decoding, Inequalities, Logical Venn diagram, Seating Arrangements, Puzzles and Missing numbers

UNIT II: Analytical and decision making

Syllogism, Pattern completion and figure series, Embedded Figure and counting of figures, Cube & Dice, Paper cutting and folding, Data sufficiency, Course of Action, Critical Reasoning, Analytical and decision making.

UNIT III: Computer basics

Block diagram of Digital Computer, Classification of Computers, Memory System, Primary storage, Auxiliary memory, Cache memory, Computer Software (System/Application Software). MS Word Basics: The word screen, Getting to word documents, typing and Revising text, Finding and Replacing, Editing and Proofing tools, Formatting text characters, Formatting Paragraph, Document templates., Page set up, tables, Mail Merge, Macros, protecting documents, printing a document.

UNIT IV: MS-Excel

Introduction, Worksheet basics, Creating worksheet, Heading information, Data & Text, Date & Time, Alphanumeric values, Saving & quitting worksheet, Opening and moving around in an existing worksheet, Toolbars and Menus, Excel shortcut and function keys, Working with single and multiple workbook, Working with formulae & cell referencing, Auto sum, coping formulae, Absolute & relative addressing, Worksheet with ranges, Formatting of worksheet, Previewing & Printing worksheet, Graphs and charts, Database, Creating and using macros, Multiple worksheets- concepts. Introduction of Open Source Applications: LibreOffice, OpenOffice and Google Docs etc.

UNIT V: Web Surfing and Cyber Security

An Overview: working of Internet, Browsing the Internet, E-Mail, Components of E-Mail, Address Book, Troubleshooting in E-Mail, Browsers: Netscape Navigator, Microsoft Internet Explorer, Google Chrome, Mozilla Firefox, Tor, Search Engines like Google, DuckDuckGo etc, Visiting web sites: Downloading. Cyber Security: Introduction to Information System, Type of information system, CIA model of Information Characteristics, Introduction to Information Security, Need of Information Security, Cyber Security, phishing, spamming, fake news, general issues related to cyber security, Business need, Ethical and Professional issues of security.

Suggested Readings:

1. Sharma, A., "How to prepare for Data Interpretation and Logical Reasoning for the CAT" McGraw Hill



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Education Pvt. Ltd., New Delhi, India, 2011, Ed. 5, ISBN 978 2007 070 481

2. Aggarwal, R.S., "A Modern Approach to Verbal and Non-verbal Reasoning" S. Chand Publishers New Delhi, India, 2010, ISBN 10: 8121905516

3. Madan, Sushila, Introduction to Essential tools, Jain Book Agency, New Delhi/India, 2009, 5th ed..

4. Goel, Anita, Computer Fundamentals, Pearson Education, India, 2012

5. Michael E. Whitman and Herbert J. Mattord, "Principles of Information Security," Sixth Edition, Cengage Learning, 2017

Course Learning Outcome (CLO): Upon successful completion of this course the student will:

1. Familiarize with analogy, number system, set theory and its applications, number system and puzzles.
2. To understand the basics of Syllogism, figure problems, critical and analytical reasoning.
3. Familiarize with word processing application and worksheet.
4. To understand the basics of web surfing and cyber security.



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III Year: VI Semester (PRACTICAL)

Information Security Audit and Compliance Lab

Code: BFS651

L	T	P	C
0	0	2	1

Course objectives: The course aims to make students gain knowledge are as follow:

1. To introduce the fundamentals of information security audits and compliance requirements in IT systems.
2. To provide hands-on experience in identifying vulnerabilities, analyzing logs, and evaluating access control mechanisms.
3. To develop students' ability to perform security assessments of networks, systems, and web applications.
4. To train students in preparing audit documentation, reporting findings, and recommending corrective actions.
5. To enhance understanding of regulatory frameworks such as ISO 27001, GDPR, and healthcare privacy standards.

PRACTICALS

1. Perform a basic audit of a Windows/Linux system using an ISO 27001-based checklist.
2. Verify account security configurations and password policies against organization standards.
3. Identify open ports, services, and vulnerabilities on a test network.
4. Perform vulnerability scanning on a demo web application using ZAP.
5. Analyze system and network logs to detect unauthorized activity.
6. Assess access control systems (CCTV, locks, biometrics) in a lab or campus setup.
7. Develop a basic risk matrix and control recommendation report.
8. Review privacy practices for a hypothetical healthcare or EU-based firm.
9. Understand how security events are logged, correlated, and responded to.
10. Compile audit findings, create CAPA recommendations, and prepare a summary report.

Suggested Readings

1. **James DeLuccia IV** – *IT Compliance and Controls: Best Practices for Implementation*
2. **Debra S. Herrmann** – *Complete Guide to Security and Privacy Metrics*, CRC Press
3. **David Kim & Michael Solomon** – *Fundamentals of Information Systems Security*, Jones & Bartlett Learning
4. **Krishna B.** – *Cyber Laws and Information Technology Regulation*, PHI Learning
5. **Alan Calder** – *IT Governance: An International Guide to Data Security and ISO27001/27002*, Kogan Page
6. **NIST Special Publications (SP 800 series)** – <https://csrc.nist.gov/publications/sp800>
7. **OWASP Foundation** – *Web Security Testing Guide (WSTG)*



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III Year: VI Semester (PRACTICAL)
Crime Scene Investigation Techniques Lab
Code: BFS652

L	T	P	C
0	0	2	1

Course objectives: The course aims to make students gain knowledge are as follow:

PRACTICALS

1. To Know the Basic Steps of Crime Scene Management Followed by an Investigator.
2. To perform Search Methods Used at Outdoor and Indoor Scene of Crime.
3. Collection of Physical Evidences from Crime Scene.
4. Packing of different types of Evidences retrieved from crime scene.
5. Forwarding of different types of Evidences retrieved from crime scene.
6. Photography of Indoor, Outdoor and Vehicular Crime Scene
7. Sketching of the Outdoor Scene of Crime i.e. Hit & Run or Drowning and Suicide.
8. Sketching of the Indoor Scene of Crime i.e. Criminal Trespass or Theft and . Homicide.
9. Reconstruction of Scene of Crime of a Suicide and Murder.
10. Report writing in Homicide/suicide crime scene.
11. Examination of witness during courtroom trials.

Suggested Readings

1. B.R.Sharma : Forensic science in criminal Investigation & Trails.
2. James.S.H and Nordby J.J: Forensic Science- An introduction to scientific and investigative techniques.
3. Saferstein: Criminalistics - An introduction to Forensic Science.

Course Learning Outcome (CLO): Students will be able to

1. Gain knowledge of collection of physical evidences.
 2. Understand the methods of packing and forwarding the different types of evidences from crime scene investigation.
 3. Record the indoor and outdoor crime scene through photography.
 4. Analyze the crime scene by searching, sketching and photography at crime scene.
 5. Evaluate the witness testimony during courtroom trials.
- Develop the crime scene investigation methods.



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III Year: VI Semester (PRACTICAL)
Forensic Serology and Odontology Lab
Code: BFS653

L	T	P	C
0	0	2	1

Course objectives: The course aims to make students gain knowledge are as follow:
Students will learn about the examination of blood and other biological fluids by chemical tests.

PRACTICALS

1. To identify blood samples by chemical tests.
2. To carry out the crystal test on a blood sample.
3. To determine blood group from fresh blood samples.
4. RH factor of human blood
5. To study the correlation between impact angle and shape of bloodstain.
6. To identify the point of convergence from the bloodstain patterns.
7. To identify the given stain as saliva, urine and sweat.
8. To compare dental casts from unknown and known samples for human identification in forensic cases.
9. To record and identify teeth using the FDI and Palmer dental coding systems to standardize dental charting.
10. To estimate the chronological age of children based on the sequence and timing of tooth eruption using standard eruption charts
11. To create and analyze bite mark patterns using dental models and wax slabs to simulate human skin impressions.
12. To measure mesiodistal and buccolingual dimensions of teeth and determine sex using odontometric indices.

Suggested Readings

1. Dr. R. Krishnamurty- Forensic biology
2. R.Li- Forensic biology

Course Learning Outcome (CLO): Students will be able to understand:

1. Understand the procedure of Preliminary examination of human blood.
2. Evaluate the methods of collection, packaging and forwarding of various biological fluids.
3. Analyze the correlation between impact angle and shape of bloodstains
4. Apply the methods for preliminary examination of biological fluids.
5. Elaborate the test on a blood sample and other biological fluid.



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B. Sc. (Honors with Research) Forensic Science
Study Evaluation Scheme (As per NEP2020)
Effective from the session 2025-26

IV Year: VII Semester

S No	Course Code	Course	L	T	P	Evaluation Scheme		Total	Credits	Course Type
						CIE	ESE			
Theory										
1	BFS701	Advanced Fingerprinting Technology	3	0	0	25	75	100	3	Major
2	BFS702	Forensic Genomics and DNA profiling	3	0	0	25	75	100	3	Major
3	BFS703	Forensic Pharmacy and Pharmacology of Controlled Drugs	3	0	0	25	75	100	3	Major
4	BFS704	Narcotic Drugs and Psychotropic Substances	3	0	0	25	75	100	3	Major
5	BFS705	Audio and Video Analysis	3	0	0	25	75	100	3	Minor
6	BFS706	Research Methodology-I	3	0	0	25	75	100	3	VAC
7	-----	Discipline Specific Elective -3	3	0	0	25	75	100	3	Minor
Practical										
8	BFS751	Advanced Fingerprinting Technology Lab	0	0	2	25	75	100	1	Major
9	BFS752	Forensic Genomics and DNA profiling Lab	0	0	2	25	75	100	1	Major
10	BFS753	Audio and Video Analysis Lab and Forensic Entomology Lab	0	0	2	25	75	100	1	AEC
Total			21	0	6	250	700	1000	24	

Evaluation Scheme, promotion scheme, grading system, and CGPA calculation adopted from CCFUP, by UGC 2022.

L	Lecture
T	Tutorial
P	Practical
CIE	Continuous Internal Evaluation
ESE	End Semester Examination
GE	Generic Elective
AEC	Ability Enhancement Course
SEC	Skill Enhancement Courses
DSE	Discipline Specific Elective
MD	Multidisciplinary
VAC	Value-added courses common for all UG

Discipline Specific Elective -3	
Course Code	Course Name
BFS721	Forensic Entomology
BFS722	Mobile and Cloud Forensics
BFS723	Entrepreneurship in Forensic Science
BFS724	Fire, Arson, and explosive crime Investigation



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IV Year: VII Semester (THEORY)
Advanced Fingerprinting Technology
Code: BFS 701

L	T	P	C
3	0	0	3

Course Objectives (COs):

1. To develop advanced understanding of fingerprint classification and ridgeology.
2. To train students in modern fingerprint development techniques and digital enhancement.
3. To familiarize with biometric systems and automated fingerprint identification systems (AFIS).
4. To enable students to analyze partial, distorted, and latent fingerprints.
5. To explore recent trends, research, and legal aspects in fingerprint technology.

UNIT I: Advanced Fingerprint Classification and Ridgeology

Galton details and minutiae – advanced patterns, Henry classification system – sub-classifications, Ridge characteristics, pore structure and their forensic relevance, Ridgeology: Individualization through ridge characteristics, Level I, II, and III details in fingerprint examination.

UNIT II: Development Techniques and Enhancement Methods

Latest chemical methods: Ninhydrin analogues, DFO, IND, SPR. Advanced physical methods: Nano-powders, fluorescent powders. Environmental considerations in fingerprint development. Cyanoacrylate fuming: chamber design and optimization. Digital enhancement and image processing tools (Photoshop, ScanPro, etc.).

UNIT III: Latent, Plastic and Distorted Fingerprint Examination

Collection and preservation of latent fingerprints. Examination of fingerprints on porous, non-porous, and curved surfaces. Lifting techniques: gelatin lifters, tape, hinge lifters. Partial and distorted fingerprint comparison. Elimination prints and handling overlapping prints.

UNIT IV: Biometric Systems and Automated Fingerprint Identification

Biometric modalities: fingerprint, palmprint, iris, and facial recognition. Introduction to AFIS and its components. IAFIS, UIDAI (Aadhaar), and national biometric systems. Fingerprint scanners and sensor technology. Data storage, retrieval, and matching algorithms.

UNIT V: Trends, Research, and Legal Framework

Fingerprint forgery, spoofing, and anti-spoofing techniques. 3D fingerprint imaging and scanning. Research trends in fingerprint genomics and DNA correlation. Daubert standard and admissibility in court. Case studies: landmark judgments involving fingerprint evidence.

Suggested Readings:

- Champod, C., et al. Fingerprints and Other Ridge Skin Impressions.
- Ashbaugh, D. R. Ridgeology: The Science of Fingerprint Identification.
- Jain, A., et al. Handbook of Biometrics.
- Lee, H. C. & Gaensslen, R. E. Advances in Fingerprint Technology.



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Faculty of Health and Life Sciences

Department of Forensic Science

Course Learning Outcomes (CLOs): Upon successful completion of this course, students will be able to:

1. Identify and classify fingerprints using advanced classification systems.
2. Apply various physical and chemical techniques to develop latent fingerprints.
3. Operate and interpret data using AFIS and other biometric systems.
4. Analyze difficult prints and evaluate their evidentiary value in forensic contexts.
5. Assess advancements in fingerprint technologies including digital and 3D methods.



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Faculty of Health and Life Sciences

Department of Forensic Science

IV Year: VII Semester (THEORY)

Forensic Genomics and DNA Profiling

Code: BFS 702

L	T	P	C
3	0	0	3

Course Objectives (COs):

1. To introduce fundamental concepts of forensic genomics and molecular genetics.
2. To understand the principles and methodologies of DNA extraction, quantification, and amplification.
3. To provide knowledge of various DNA typing techniques and interpretation of results.
4. To explore the applications of DNA profiling in criminal investigations, paternity disputes, and disaster victim identification.
5. To examine ethical, legal, and privacy issues in forensic genomics.

UNIT I: Fundamentals of Forensic Genomics

Introduction to forensic genomics and its evolution, Structure and types of DNA: Nuclear DNA, Mitochondrial DNA, Genes, chromosomes, genome, and polymorphism, Genetic markers: STRs, VNTRs, SNPs, Alu repeats, Human genome and population genetics in forensic context.

UNIT II: DNA Extraction, Quantification, and Amplification

Biological evidence sources for DNA analysis, DNA extraction methods: Organic, Chelex, silica-based, automated systems, DNA quantification: UV spectrophotometry, Fluorometry, qPCR., Polymerase Chain Reaction (PCR): Principle, types, inhibitors, and optimization., Precautions to avoid contamination and degradation.

UNIT III: DNA Typing and Profiling Techniques

Short Tandem Repeat (STR) analysis – autosomal and mini-STRs. Y-chromosome STRs – applications in male lineage analysis. Mitochondrial DNA (mtDNA) analysis – maternal lineage, hair and bone samples. Single Nucleotide Polymorphisms (SNPs) and their forensic relevance. Capillary electrophoresis, electropherograms, and allelic ladder.

UNIT IV: Applications of DNA Profiling in Forensics

DNA profiling in criminal cases, sexual assault, paternity, and kinship testing, Role in disaster victim identification (DVI), Cold cases and exoneration through DNA CODIS and national/international DNA databases, DNA phenotyping and ancestry prediction.

UNIT V: Legal, Ethical and Quality Control Issues

Legal standards for DNA admissibility (Daubert/Frye), Chain of custody, and documentation. Quality assurance and accreditation of forensic DNA labs (ISO 17025). Ethical concerns: privacy, consent, and misuse of genomic data. Case studies: notable Indian and international cases using DNA evidence.

Suggested Readings:

- Butler, J. M. *Forensic DNA Typing* (Academic Press)
- Primrose, S. B., & Twyman, R. M. *Principles of Gene Manipulation and Genomics*
- Thomson, J., & Newton, C. *Forensic DNA Technology*
- Linacre, A. *Forensic DNA Analysis: Current Practices and Emerging Technologies*
- Government & legal documents on DNA Technology (Use and Application) Regulation Bill, India

Course Learning Outcomes (CLOs): By the end of this course, students will be able to:

1. Describe the structure and function of DNA and genetic markers used in forensic analysis.



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2. Perform DNA extraction, quantification, and PCR-based amplification techniques.
3. Differentiate between DNA typing methods like STR, Y-STR, and mtDNA profiling.
4. Analyze and interpret DNA profiles in forensic casework.
5. Discuss the legal, ethical, and privacy aspects related to DNA databases and genomic data.



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IV Year: VII Semester (THEORY)

Forensic Pharmacy and Pharmacology of Controlled Drugs

Code: BFS703

L	T	P	C
3	0	0	3

Course Objectives (COs):

1. To provide foundational knowledge of pharmaceutical principles relevant to forensic science.
2. To understand the pharmacodynamics and pharmacokinetics of drugs of forensic interest.
3. To study controlled and abused drugs under legal classification.
4. To explore forensic aspects of drug identification, dosage, administration, and toxicology.
5. To examine legal frameworks and case studies involving drug abuse and poisoning.

UNIT I: Fundamentals of Forensic Pharmacy

Introduction to forensic pharmacy: definition, scope, significance, Historical development and evolution of drug laws in India, Dosage forms and routes of drug administration, pharmaceutical dosage regulations, Sources of drugs: natural, synthetic, semi-synthetic.

UNIT II: Pharmacology Basics in Forensic Context

Pharmacokinetics: Absorption, distribution, metabolism, excretion (ADME), Pharmacodynamics: Mechanism of drug action, receptors, dose-response relationship, Drug tolerance, dependence, synergism, antagonism, and allergic reactions, Factors influencing drug effects: age, sex, disease, genetics, Role of pharmacogenomics in forensic investigations, Drug scheduling: Criteria for classification (abuse potential, medical utility).

UNIT III: Controlled Drugs and Substances of Abuse

Classification of controlled drugs: narcotics, stimulants, depressants, hallucinogens. Common drugs of abuse: opiates, cannabis, cocaine, amphetamines, LSD, barbiturates, benzodiazepines, Designer drugs and synthetic cannabinoids. Forensic indicators of drug addiction and overdose. Street names, dosage effects, signs, and symptoms.

UNIT IV: Drug Laws and Legal Provisions

Narcotic Drugs and Psychotropic Substances (NDPS) Act, 1985, Drugs and Cosmetics Act, 1940 and Rules. Poisons Act, 1919 and regulatory framework. International drug control conventions (UNODC, WHO guidelines). Role of regulatory agencies: CDSCO, NCB, FSSAI, State Drug Control.

UNIT V: Emerging Threats, Drug-Facilitated Crimes, Regulatory Compliance and Ethics

New Psychoactive Substances (NPS): Synthetic opioids, designer benzodiazepines, and nitazenes. Drug-facilitated crimes: Date-rape drugs (GHB, flunitrazepam): Detection windows and sample handling. Pharmacological hair testing for chronic abuse. Ethical dilemmas: Pain management vs. abuse risk; patient privacy vs. mandatory reporting.

Suggested Readings:

1. Gupta, P.K. (2023). Forensic Pharmacy and Pharmacology of Controlled Substances. Springer.
2. Moffat, A.C. (2011). Clarke's Analysis of Drugs and Poisons. Pharmaceutical Press.
3. Sathyanarayana, D. N. Essentials of Forensic Pharmacy
4. Baselt, R. C. Disposition of Toxic Drugs and Chemicals in Man
5. Rang, H. P., & Dale, M. M. Pharmacology
6. Sharma, B. Forensic Science in Criminal Investigation and Trials
7. Indian government publications on NDPS Act, Poisons Act, and Drugs & Cosmetics Act

Course Learning Outcomes (CLOs): After completing the course, students will be able to:

1. Describe basic pharmaceutical principles and drug classifications.



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2. Understand drug actions, metabolism, and interactions within the human body.
3. Identify and interpret forensic relevance of controlled and abused substances.
4. Apply knowledge of forensic pharmacology in crime and toxicology investigations.
5. Evaluate legal implications related to drugs under forensic and judicial contexts.



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IV Year: VII Semester (THEORY)
Narcotic Drugs and Psychotropic Substances
Code: BFS704

L	T	P	C
3	0	0	3

Course Objectives (COs)

1. To introduce the classification and chemical nature of narcotic drugs and psychotropic substances.
2. To explain the pharmacological and toxicological effects of these substances.
3. To provide an overview of national and international control laws and agencies.
4. To develop an understanding of methods of detection and analysis in forensic cases.
5. To familiarize students with procedures for sample collection, preservation, and reporting in drug-related investigations.

Unit I: Introduction to Narcotic Drugs and Psychotropic Substances

Definition of narcotic and psychotropic substances, Classification: natural, semi-synthetic, synthetic, Common drugs: opium, heroin, morphine, cannabis, cocaine, LSD, amphetamines
Difference between use, misuse, and abuse

Unit II: Pharmacology and Toxicology

Basic principles of drug action, Routes of administration and absorption, Signs and symptoms of drug abuse, Health and psychological effects of commonly abused substances

Unit III: Legal Framework

NDPS Act, 1985 – objectives, schedules, and amendments, Role of Narcotics Control Bureau (NCB) and other agencies, International drug control laws (UNODC, INCB), Punishment and penalties for drug offenses

Unit IV: Forensic Aspects

Collection, preservation, and forwarding of narcotic drug samples, Qualitative and quantitative analysis of drugs in forensic laboratories, Screening and confirmatory tests (color tests, TLC, GC, HPLC, MS – basic intro), Chain of custody and documentation

Unit V: Case Studies and Prevention

Common trends in drug abuse and trafficking, Case studies related to drug seizures and forensic findings, Role of forensic experts in NDPS cases, Prevention, rehabilitation, and awareness programs

Suggested Readings

1. Drug Abuse and Addiction in Medical Illness: Causes, Consequences and Treatment – Edited by J. MacKay & J. Verster (Springer)
2. The Narcotic Drugs and Psychotropic Substances Act, 1985 – Government of India Publication or Bare Act (Latest Edition)
3. Forensic Pharmacy – B.M. Mithal (Vallabh Prakashan)
– Covers Indian drug laws and forensic implications
4. Introduction to Forensic Science – Richard Saferstein
– Includes chapters on drug analysis techniques



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5. UNODC Publications (available online at: <https://www.unodc.org>)
– Global data, legal frameworks, and enforcement models

Course Learning Outcomes (CLOs): By the end of the course, students will be able to:

1. Understand the classification and effects of narcotic and psychotropic substances.
2. Describe the laws regulating drug use and enforcement agencies.
3. Explain the forensic procedures for handling drug-related evidence.
4. Identify basic analytical techniques used for drug detection.
5. Demonstrate awareness of social and legal implications of drug abuse.



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IV Year: VII Semester (THEORY)

Audio and Video Analysis

BFS 705

L	T	P	C
3	0	0	3

Course Objectives

1. To introduce students to the fundamentals of audio and video analysis in forensic investigations.
2. To provide knowledge of the tools and techniques used in analyzing electronic media.
3. To build competence in identifying tampering, enhancement, and authentication of media files.
4. To highlight the importance of maintaining chain of custody and legal considerations.

UNIT I: Fundamentals of Audio and Video

Basics of sound and video: pitch, frequency, amplitude, frame rate, resolution, Analog vs. digital formats, Common audio/video file formats (MP3, WAV, MP4, AVI, etc.), Recording devices: microphones, cameras, CCTV systems

UNIT II: Introduction to Forensic Audio Analysis

Audio signal processing: filtering, noise reduction, Voice identification and speaker recognition (basic principles), Detection of tampering or splicing in audio files, Legal acceptability of audio evidence

UNIT III: Introduction to Forensic Video Analysis

Video enhancement techniques: brightness, contrast, stabilization, Identification of objects, persons, and actions in video, Frame analysis and sequence reconstruction, Video compression artifacts and quality issues

UNIT IV: Tools and Techniques in Audio-Video Forensics

Basic software tools: Audacity, Adobe Premiere, Amped FIVE (overview), Introduction to waveform and spectrogram analysis, Metadata extraction and analysis, Chain of custody for digital media evidence

UNIT V: Case Studies and Legal Aspects

Case studies involving audio-video evidence, Report writing and expert testimony, Ethical and legal considerations in media handling, Role of media analysis in cybercrime and criminal investigations

Suggested Readings

1. C. C. Koenig – *Spectral Audio Signal Processing* (Wiley)
2. Derrick Story & Mikkel Aaland – *Digital Video Pocket Guide* (O'Reilly Media)
3. James A. Tan – *Forensic Applications of Digital Imaging* (CRC Press)
4. Douglas A. Lacey – *Audio and Video Forensics Using Adobe Tools* (CRC Press, 2020)
5. Chet Hosmer – *Python Forensics: A Workbench for Inventing and Sharing Digital Forensic Technology* (Elsevier, 2014)
6. SWGDE (Scientific Working Group on Digital Evidence) – Guidelines and best practices (available online: www.swgde.org)

Course Learning Outcomes (CLOs)

After completing this course, students will be able to:

1. Understand basic principles of audio and video signals.
2. Identify common formats and analyze content for forensic use.



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3. Apply basic enhancement and authentication techniques.
4. Use simple software tools for preliminary audio/video analysis.



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IV Year: VII Semester (THEORY)
Research Methodology-I
Code: BFS706

L	T	P	C
3	0	0	3

Course objective:

1. To introduce the nature of problem to be studied and identifying the related area of knowledge.
2. To analyzing data appropriate to the problem.
3. To reviewing literature to understand how others have approached or dealt with the problem.
4. To know the idea of paper and thesis writing.

UNIT I: Introduction of research methodology:

Meaning of research, objectives of research, types of research, significance of research, problems encountered by researchers in India.

UNIT II: Research problem:

Definition, necessity and techniques of defining research problem, Formulation of research problem, Objectives of research problem.

UNIT III: Research design:

Meaning, need and features of good research design, Types of Research Designs, Basic Principles of Experimental Designs, Design of experiments, and Synopsis design for research topic.

UNIT IV: Editing, Data Collection and Validation:

Primary and secondary data, Methods of collecting primary and secondary data, Importance and methods of editing and data validation.

UNIT V: Paper/Thesis Writing and Report Generation:

Basic concepts of paper their writing and report generation, review of literature, Concepts of Bibliography and References, significance of report writing, steps of report writing, Types of Research reports, Methods of presentation of report.

SUGGESTED READINGS

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.
2. Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International. 418p.
3. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, EssEss Publications. 2 volumes.
4. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p.
5. Wadehra, B.L. 2000. Law relating to patents, trade marks, copyright designs and geographical indications. Universal Law Publishing.
6. Anthony, M., Graziano, A.M. and Raulin, M.L., 2009. Research Methods: A Process of Inquiry, Allyn and Bacon.
7. Carlos, C.M., 2000. Intellectual property rights, the WTO and developing countries: the TRIPS agreement and policy options. Zed Books, New York.
8. Coley, S.M. and Scheinberg, C. A., 1990, "Proposal Writing", Sage Publications.



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9. Day, R.A., 1992. How to Write and Publish a Scientific Paper, Cambridge University Press.
10. Fink, A., 2009. Conducting Research Literature Reviews: From the Internet to Paper. Sage Publications
11. Leedy, P.D. and Ormrod, J.E., 2004 Practical Research: Planning and Design, Prentice Hall.
12. Satarkar, S.V., 2000. Intellectual property rights and Copy right. EssEss Publications.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

1. Understand the limitations of particular research methods.
2. Develop skills in qualitative and quantitative data analysis and presentation.
3. Develop advanced critical thinking skills



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IV Year: VII Semester (THEORY)

Discipline Specific Elective -3

Forensic Entomology

Code: BFS721

L	T	P	C
3	0	0	3

Course Objectives

1. To introduce the fundamental concepts of entomology in relation to forensic science.
2. To familiarize students with the role of insects in criminal investigations.
3. To provide a basic understanding of insect development, succession, and their forensic applications.

UNIT I: Introduction to Forensic Entomology

Definition, history, and scope of forensic entomology, Role of insects in forensic investigations
Types of forensic entomology: medicolegal, urban, and stored product

UNIT II: Insect Biology and Classification

General characteristics of insects, Classification of insects of forensic importance, Morphology of common forensic insects (flies, beetles, etc.)

UNIT III: Insect Development and Life Cycle

Metamorphosis: complete and incomplete, Life cycle of blowflies and beetles, Factors affecting insect development: temperature, humidity, etc.

UNIT IV: Insects and Decomposition

Stages of decomposition and associated insect species, Insect succession on decomposing remains, estimating post-mortem interval (PMI) using insects

UNIT V: Collection and Analysis of Insect Evidence

Collection, preservation, and documentation of entomological evidence, Laboratory analysis and identification of specimens, Case studies involving forensic entomology

Suggesting Readings

1. Byrd, J.H. & Castner, J.L. Forensic Entomology: The Utility of Arthropods in Legal Investigations (CRC Press, 2nd Edition, 2010)
2. Smith, K.G.V. A Manual of Forensic Entomology, (Cornell University Press, 1986)
3. Catts, E.P. & Haskell, N.H. Entomology and Death: A Procedural Guide (Joyce's Print Shop, 1990)
4. Amoret Whitaker, Forensic Entomology: An Introduction (Wiley-Blackwell, 2007)
5. Gennard, D.E. Forensic Entomology: An Introduction (Wiley, 3rd Edition, 2020)

Course Learning Outcomes (CLOs)

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

1. Understand the significance of insects in forensic investigations.
2. Identify and classify insects commonly found at crime scenes.
3. Describe the life cycles of key forensic insects.
4. Analyze insect evidence to estimate time since death.



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IV Year: VII Semester (THEORY)

Discipline Specific Elective -3

Mobile and Cloud Forensics

Code: BFS722

L	T	P	C
3	0	0	3

Course Objective:

1. To introduce students to the basic concepts of mobile and cloud technologies.
2. To understand the types of evidence found in mobile and cloud environments.
3. To familiarize students with tools and methods used in forensic extraction and analysis.
4. To create awareness of legal challenges and digital evidence handling in mobile/cloud cases.
5. To explore current trends, challenges, and case studies in mobile and cloud forensics.

Unit 1: Introduction to Mobile Forensics

Overview of Mobile Forensics, Types of Mobile Devices (Smartphones, Tablets, IoT Devices), Mobile Operating Systems (Android, iOS, Others), Legal and Ethical Considerations in Mobile Forensics

Unit 2: Mobile Forensic Acquisition & Analysis

Forensic Imaging of Mobile Devices (Logical vs. Physical Acquisition), Tools for Mobile Forensics (Cellebrite, Oxygen Forensics, Magnet AXIOM), Data Extraction and Analysis (Call Logs, SMS, GPS, App Data), Handling Locked and Encrypted Devices

Unit 3: Cloud Computing & Forensics Fundamentals

Introduction to Cloud Computing (IaaS, PaaS, SaaS), Cloud Storage Forensics (Google Drive, Dropbox, iCloud), Challenges in Cloud Forensics (Jurisdiction, Data Volatility), Legal Aspects of Cloud Evidence Collection

Unit 4: Cloud Forensic Investigation Techniques

Evidence Acquisition from Cloud Services, Forensic Tools for Cloud Investigations (FTK, EnCase, Open-Source Tools), Metadata and Log Analysis in Cloud Environments, Case Studies on Cloud-Based Crimes

Unit 5: Emerging Trends & Case Studies

IoT Forensics (Smart Devices, Wearables), Social Media Forensics (Facebook, WhatsApp, Telegram), Case Studies on Mobile & Cloud-Related Crimes Future Challenges in Digital Forensics

Course Learning Outcomes (CLO): Understand the fundamentals of mobile and cloud forensics.

1. Apply forensic techniques to extract and analyze data from mobile devices.
2. Evaluate cloud-based evidence and its legal implications.
3. Use forensic tools for investigations in mobile and cloud environments.
4. Explain mobile and cloud forensic principles.

Suggested Readings:

1. "Mobile Forensic Investigations: A Guide to Evidence Collection, Analysis, and Presentation" by Lee Reiber
2. "Cloud Forensics: Techniques and Tools" by Darren Quick & Ben Martini
3. "Digital Forensics with Open-Source Tools" by Cory Altheide & Harlan Carvey



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4. "iOS Forensic Analysis for iPhone and iPad" by Sean Morrissey
5. Research Papers & NIST Guidelines on Mobile & Cloud Forensics



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IV Year: VII Semester (THEORY)
Discipline Specific Elective -3
Entrepreneurship in Forensic Sciences
Code: BFS723

L	T	P	C
3	0	0	3

Course Objectives (COs)

1. To introduce the fundamentals of entrepreneurship and innovation.
2. To explore opportunities for entrepreneurship in the field of forensic science.
3. To equip students with the skills to identify, plan, and launch forensic-based ventures.
4. To create awareness about legal, ethical, and financial aspects of running a forensic enterprise.
5. To inspire entrepreneurial thinking through case studies and success stories in forensic services.

Unit I: Fundamentals of Entrepreneurship

Definition, characteristics, and types of entrepreneurships, Importance of entrepreneurship in science and technology, Role of entrepreneurship in economic development, Traits and skills of a successful entrepreneur

Unit II: Forensic Science and Business Opportunities

Overview of private forensic service sectors (DNA labs, cyber forensics, fingerprint bureau, etc.), Opportunities in forensic consultancy, private labs, training institutes, and expert witness services, Market demand and startup trends in forensic science, Entrepreneurship in forensic software, surveillance, and security

Unit III: Planning a Forensic Startup

Idea generation and opportunity analysis, Business model canvas and feasibility study, Project report preparation and proposal writing, Legal structure and registration of a forensic firm

Unit IV: Financial and Legal Aspects

Basics of financial planning: funding sources, budgeting, pricing, Intellectual property rights and forensic product innovation, Ethical considerations in forensic businesses, Licenses, regulations, and accreditation (e.g., NABL, ISO, FSSAI for labs)

Unit V: Case Studies and Government Support

Case studies of successful forensic entrepreneurs and startups in India, Government schemes and incubation support (MSME, Startup India, DBT, BIRAC, etc.), Role of academic institutions in promoting forensic entrepreneurship, Challenges, risks, and future prospects

Suggested Readings

1. Entrepreneurship Development – S.S. Khanka (S. Chand & Co.)
2. Entrepreneurship – Robert D. Hisrich, Michael P. Peters (McGraw-Hill)
3. Innovation and Entrepreneurship – Peter F. Drucker (Harper Business)
4. Forensic Science in India: A Vision for the Future – BPR&D Publication
5. Start-up India Portal & Guidelines – www.startupindia.gov.in



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6. Reports & Schemes from DBT, DST, and MSME (for forensic/lab startups)

Course Learning Outcomes (CLOs)

After completing this course, students will be able to:

1. Understand core concepts of entrepreneurship and its application in forensic science.
2. Identify business opportunities in forensic services and allied sectors.
3. Prepare basic business plans for forensic-based ventures.
4. Understand financial and legal requirements for setting up a forensic firm.
5. Analyze success stories and use institutional/government support for entrepreneurial ventures.



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IV Year: VII Semester (THEORY)
Discipline Specific Elective -3
Fire, Arson, and Explosive Crime Investigation
Code: BFS724

L	T	P	C
3	0	0	3

Course Objectives:

1. Understand the basic science of fire and explosions.
2. Identify the causes, nature, and evidence related to arson and explosive-related crimes.
3. Learn about fire behaviour, ignition sources, and accelerants.
4. Understand techniques of crime scene investigation related to fire and explosions.
5. Apply forensic methods for evidence collection, preservation, and interpretation in fire and explosion scenes.

UNIT I: Introduction to Fire Science

Definition and chemistry of fire, Fire triangle and tetrahedron, Stages of fire (incipient, growth, fully developed, decay), Types and classes of fire (Class A, B, C, D, K), Fire behaviour in open and closed spaces

UNIT II: Arson – Nature, Causes and Indicators (9 Hours)

Definition and types of arson, Motives behind arson (insurance fraud, revenge, vandalism, etc.), Common indicators of arson: burn patterns, multiple points of origin, accelerants, Difference between accidental and intentional fires

UNIT III: Crime Scene Investigation in Fire and Arson Cases

Fire scene safety and securing the scene, Role of first responders and fire investigators
Identification and collection of fire debris, Use of K-9 units and detection devices, Laboratory analysis of accelerants and residues

UNIT IV: Introduction to Explosives and Explosion Scene Investigation

Definition and classification of explosives (low vs. high explosives), Types of explosions (mechanical, chemical, nuclear), Components of improvised explosive devices (IEDs), Basic approach to post-blast scene investigation, Safety and protocols during explosion investigation

UNIT V: Forensic Analysis and Legal Aspects

Laboratory analysis of explosive residues (TLC, GC-MS, etc.), Forensic role in establishing cause and origin of fire/explosion, Case studies of arson and bombing incidents, Laws related to arson and explosives (IPC, Explosives Act), Role of forensic experts in court

Suggested Readings:

1. DeHaan, J.D. & Iove, D.J. (2011). *Kirk's Fire Investigation* (7th Ed.). Pearson.
2. National Fire Protection Association (NFPA). *NFPA 921: Guide for Fire and Explosion Investigations*.
3. Lee, H.C. & Gaensslen, R.E. (2001). *Forensic Science: An Introduction to Scientific and Investigative Techniques*. CRC Press.
4. Grosse, C. (2002). *Fire Investigation*. Blackstone Press.
5. Hawley, C.G. (1985). *The Chemistry of Explosives*. Royal Society of Chemistry.



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Course Learning Outcomes: After completing this course, students will be able to

1. Explain the fundamental principles of fire behavior and classification.
2. Identify arson indicators and understand the motives behind such crimes.
3. Conduct basic fire and explosion scene investigation.
4. Recognize and handle explosive materials and devices with safety.
5. Interpret forensic findings and understand their legal implications in fire and explosive cases.



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IV Year: VII Semester (THEORY)
Advanced Fingerprinting Technology Lab
Code: BFS751

L	T	P	C
2	0	0	1

Course Objective:

1. To provide hands-on experience with advanced fingerprint classification and enhancement methods.
2. To train students in developing, collecting, preserving, and analyzing various types of fingerprint impressions.
3. To familiarize students with biometric and digital systems used in modern fingerprint analysis.
4. To build practical knowledge of legal and forensic standards in fingerprint identification.

PRACTICALS:

1. Lifting latent prints using advanced powders and fuming methods.
2. Fingerprint classification (Henry and ridgeology).
3. AFIS database creation and search simulation.
4. Image enhancement of poor-quality fingerprint samples.
5. To digitally enhance fingerprint images using basic image processing software.
6. To understand methods of fingerprint spoofing and countermeasures.

Suggested Readings:

- Champod, C., et al. Fingerprints and Other Ridge Skin Impressions.
- Ashbaugh, D. R. Ridgeology: The Science of Fingerprint Identification.
- Jain, A., et al. Handbook of Biometrics.
- Lee, H. C. & Gaensslen, R. E. Advances in Fingerprint Technology.

Course Learning Outcomes (CLOs): Upon successful completion of this course, students will be able to:

1. Identify and classify fingerprints using advanced classification systems.
2. Apply various physical and chemical techniques to develop latent fingerprints.
3. Operate and interpret data using AFIS and other biometric systems.
4. Analyze difficult prints and evaluate their evidentiary value in forensic contexts.
5. Assess advancements in fingerprint technologies including digital and 3D methods.



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IV Year: VII Semester (THEORY)

Forensic Genomics and DNA Profiling Lab

Code: BFS752

L	T	P	C
2	0	0	1

Course Objectives:

1. To develop hands-on skills in the collection, extraction, and analysis of DNA from various forensic samples.
2. To introduce molecular biology techniques used in forensic DNA profiling.
3. To understand and interpret genetic evidence in forensic cases.
4. To maintain proper documentation, sample handling, and legal protocols in DNA-based investigations.

PRACTICALS

1. To demonstrate methods for collecting and preserving biological samples (blood, hair, saliva) for DNA analysis.
2. To extract genomic DNA from blood using phenol-chloroform-isoamyl alcohol method.
3. To extract DNA from buccal swab using a commercial DNA isolation kit.
4. To extract trace DNA from forensic biological evidence using a suitable protocol.
5. To quantify and assess the purity of extracted DNA using a NanoDrop or spectrophotometer (A260/A280 ratio).
6. To perform and understand the principle of DNA amplification using PCR.
7. To amplify a short DNA sequence using a standard thermal cycler and analyze the result.
8. To simulate STR profiling using example datasets or kits (or conduct basic STR amplification if available).
9. To extract and amplify mitochondrial DNA from hair/root samples (if feasible).
10. To analyze electropherogram outputs for allele designation and DNA profile interpretation.
11. To simulate a database search (e.g., CODIS-like) for matching DNA profiles using sample datasets.

Suggested Readings

1. Butler, J.M. *Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers* (Academic Press, 2nd Edition, 2005) – A foundational text for STR-based DNA profiling.
2. Brown, T.A. *Gene Cloning and DNA Analysis: An Introduction* (Wiley-Blackwell, 7th Edition, 2016) – Useful for understanding PCR and molecular biology concepts.
3. Goodwin, W., Linacre, A., & Hadi, S. *An Introduction to Forensic Genetics* (Wiley, 2nd Edition, 2010) – Covers basics of forensic genetics and its application.
4. Singh, I. & Gaur, A. *Textbook of Forensic DNA Profiling* (Select Publications, India, 2013) – Good regional resource aligned with Indian forensic practice.
5. Lee, H.C. & Pagliaro, E.M. *Forensic DNA Applications: An Interdisciplinary Perspective* (CRC Press, 2013) – Includes case-based applications and recent developments.

Course Learning Outcomes (CLOs): After successfully completing this lab course, students will be able to:



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1. Demonstrate proper techniques for the collection, preservation, and documentation of biological evidence suitable for DNA profiling in forensic investigations.
2. Perform DNA extraction, quantification, and visualization using conventional and kit-based protocols from various forensic samples such as blood, saliva, and hair.
3. Carry out PCR amplification of genomic and mitochondrial DNA and understand the principles behind amplification-based analysis.
4. Interpret STR profiling data and electropherograms, including the analysis of allelic patterns, mixtures, and database comparisons.
5. Apply forensic genomics principles in real-life case studies, adhering to ethical and legal standards in the handling of DNA evidence.



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IV Year: VII Semester (THEORY)

Audio and Video Analysis Lab and Forensic Entomology Lab

Code: BFS753

L	T	P	C
2	0	0	1

Course Objectives:

1. To provide hands-on experience in analysing audio and video evidence.
2. To train students in using basic forensic software tools.
3. To enable students to identify tampering, enhance recordings, and extract metadata.
4. To develop skills in preparing forensic reports and maintaining evidentiary integrity.

PRACTICALS

1. Introduction to Audio Editing Software (e.g., Audacity): Interface, tools, and file import/export.
2. Recording and Saving Audio Samples: Using mobile/PC microphones.
3. Noise Reduction: Applying filters to remove background noise.
4. Audio Enhancement: Adjusting pitch, volume, and tempo.
5. Spectrogram Analysis: Visualizing sound patterns using waveform and spectrogram.
6. Voice Comparison Basics: Comparing two audio clips for speaker similarity.
7. To identify and classify insects commonly found at crime scenes, such as blowflies, beetles, and flesh flies, using taxonomic keys.
8. To examine the external anatomy of adult and larval stages of key forensic insect groups under a stereo or dissecting microscope.
9. To study and compare the stages of complete (holometabolous) and incomplete (hemimetabolous) metamorphosis using preserved specimens.
10. To analyze how varying temperature conditions affect the development rate of forensic insect larvae (e.g., blowflies).
11. To process collected insect specimens through pinning, slide preparation, and labeling for further microscopic or taxonomic analysis..

Suggested Software/Tools

- Audacity – Open-source audio editing and analysis tool
- VLC Media Player – Frame-by-frame video review
- Amped FIVE (trial/demo version) – Professional forensic video enhancement
- MediaInfo / ExifTool – Metadata extraction
- Adobe Premiere / DaVinci Resolve – Basic video enhancement (optional)
- Praat – Acoustic analysis and voice comparison

Course Learning Outcomes (CLOs):

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

1. Perform basic audio/video editing and enhancement operations.
2. Detect common signs of media tampering or manipulation.



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3. Use forensic tools to analyze audio and video evidence.
4. Extract and interpret metadata from digital recordings.



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5.

B. Sc. (Honours with Research) Forensic Science Study Evaluation Scheme (As per NEP2020) Effective from the session 2025-26											B.Sc. (Honours with Research) in Forensic Science*
IV Year: VIII Semester											
S No	Course Code	Course	L	T	P	Evaluation Scheme		Total	Credits	Course Type	
						CIE	ESE				
Theory											
1	BFS801	Advanced Digital Forensics	4	0	0	25	75	100	4	Major	
2	BFS802	Research Methodology-II	4	0	0	25	75	100	4	Major	
3	BFS803	Research Publication Ethics	2	0	0	25	75	100	2	MD	
Practical											
4	BFS851	Advanced Digital Forensics Lab	0	0	4	25	75	100	2	Major	
Total			10	0	4	100	300	400	12		
OR											
1	BFS852	Research Project /Internship at Forensic Laboratory	0	0	24	25	75	100	12	Major	
Evaluation Scheme, promotion scheme, grading system, and CGPA calculation adopted from CCFUP, by UGC 2022.											
L	Lecture										
T	Tutorial										
P	Practical										
CIE	Continuous Internal Evaluation										
ESE	End Semester Examination										
GE	Generic Elective										
AEC	Ability Enhancement Course										
SEC	Skill Enhancement Courses										
DSE	Discipline Specific Elective										
MD	Multidisciplinary										
VAC	Value-added courses common for all UG										
*4-year UG Degree (Honours): A four-year UG Honours degree in the major discipline will be awarded to those who complete a four-year degree program with 160 credits and have satisfied the credit requirements as given in table 2 in Section 5. 4-year UG Degree (Honours with Research): Students who secure 75% marks and above in the first six semesters and wish to undertake research at the undergraduate level can choose a research stream in the fourth year. They should do a research project or dissertation under the guidance of a faculty member of the University/College. The research project/dissertation will be in the major discipline. The students who secure 160 credits, including 12 credits from a research project/dissertation, are awarded UG Degree (Honours with Research).											

B.Sc. (Honours with Research) in Forensic Science*



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IV Year: VIII Semester (THEORY)

Advanced Digital Forensics

Code: BFS801

L	T	P	C
3	0	0	3

Course objective:

1. Understand advanced concepts, tools, and techniques in digital forensics.
2. Analyze digital evidence using appropriate forensic methodologies.
3. Learn about live and network forensics, mobile and cloud forensics.
4. Understand procedures for evidence acquisition, documentation, and legal compliance.
5. Apply investigative techniques in various cybercrime scenarios.

UNIT I: Fundamentals of Advanced Digital Forensics

Review of basic digital forensics concepts, Digital evidence: types, sources, and admissibility in court, File systems (FAT, NTFS, Ext) and metadata analysis, Volatile vs non-volatile evidence, Digital forensic process: identification, preservation, analysis, presentation

UNIT II: Data Acquisition and Analysis Tools

Imaging tools: FTK Imager, dd, Autopsy, Bitstream imaging and hashing techniques
File carving and recovery of deleted files, Disk and memory forensics, Windows and Linux artifact examination

UNIT III: Network and Live Forensics

Introduction to network forensics, Capturing and analyzing network traffic (Wireshark, TCPdump), Email headers and log analysis, Intrusion detection and firewall log investigation, Live system acquisition and volatile memory analysis

UNIT IV: File System & Data Recovery Forensics

File systems (FAT, NTFS, EXT, APFS), Data recovery techniques (carving, slack space analysis), Timestamp analysis (MAC times), Steganography and hidden data detection

UNIT V: Legal Aspects, Reporting and Case Studies

Cyber laws and IT Act (India), Chain of custody and documentation, Report writing and courtroom presentation, Case studies: cyberstalking, data theft, ransomware, insider threats, Role of digital forensic expert in legal system

Suggested Readings:

1. Nelson, B., Phillips, A., & Steuart, C. (2018). *Guide to Computer Forensics and Investigations* (6th Ed.). Cengage Learning.
2. Kruse, W. G., & Heiser, J. G. (2001). *Computer Forensics: Incident Response Essentials*. Addison-Wesley.
3. Maras, M.-H. (2014). *Computer Forensics: Cybercriminals, Laws, and Evidence*. Jones & Bartlett Learning.
4. Casey, E. (2011). *Digital Evidence and Computer Crime* (3rd Ed.). Academic Press.
5. Carrier, B. (2005). *File System Forensic Analysis*. Addison-Wesley.



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Course Learning Outcomes (CLOs): After successful completion of this course, students will be able to:

1. Explain advanced techniques in acquiring and analyzing digital evidence.
2. Use tools to retrieve and analyze evidence from computers, networks, and mobile devices.
3. Perform digital forensic investigations following proper legal protocols.
4. Differentiate between various sources of digital evidence including volatile data.
5. Prepare detailed forensic reports suitable for legal presentation.



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IV Year: VIII Semester (THEORY)

Research Methodology-II

Code: BFS802

L	T	P	C
3	0	0	3

Course objective:

1. Apply ethical principles and regulatory frameworks in scientific research.
2. Understand and use statistical tools for data analysis and interpretation.
3. Learn about funding mechanisms, research proposals, and project management.
4. Develop skills in scientific communication and publication ethics.
5. Familiarize with modern trends in interdisciplinary and translational research.

Unit I: Research Ethics and Integrity

Ethics in research: human and animal subjects, Institutional ethical committees and guidelines (ICMR, CPCSEA), Plagiarism and academic misconduct, Intellectual Property Rights (IPR), patents, copyrights, Responsibilities of a researcher and good research practices

Unit II: Quantitative Techniques and Data Analysis

Basic concepts: population, sample, variable, hypothesis, Descriptive and inferential statistics, Mean, median, mode, standard deviation, Hypothesis testing: t-test, chi-square, ANOVA (basic overview), Introduction to statistical tools (SPSS, R, Excel)

Unit III: Research Proposal and Grant Writing

Components of a research proposal, Identifying funding agencies (UGC, DBT, DST, ICMR), Budgeting, timeline, and project objectives, Concept of deliverables and milestones, Writing style, clarity, and logic in proposal writing

Unit IV: Scientific Communication and Publication Ethics

Types of scientific communications: posters, papers, oral presentations, Structure of a scientific article (IMRaD format), Selecting appropriate journals and understanding peer review, Authorship criteria and conflict of interest, Predatory journals and unethical publication practices

Unit V: Trends in Interdisciplinary and Translational Research

Concept of interdisciplinary and multidisciplinary research, Translational research: from lab to societal application, Collaboration models: academia-industry interface, Role of databases, bioinformatics, and AI in research, Case studies from recent scientific developments

Course Learning Outcomes (CLOs): After completing this course, students will be able to:

1. Demonstrate understanding of ethical conduct and responsibilities in scientific research.
2. Analyze data using basic statistical methods and interpret research findings.
3. Prepare research proposals with awareness of funding and budget management.
4. Communicate scientific findings ethically and effectively.
5. Recognize the importance of interdisciplinary approaches in modern research.

Suggested Readings:

1. Kothari, C.R. (2004). *Research Methodology: Methods and Techniques* (2nd Revised Edition). New Age International Publishers.
2. Gurumani, N. (2016). *Research Methodology for Biological Sciences*. MJP Publishers.
3. Resnik, D.B. (2015). *The Ethics of Science: An Introduction*. Routledge.
4. Day, R.A. & Gastel, B. (2011). *How to Write and Publish a Scientific Paper*. Cambridge University Press.



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5. Prajapati, N. & Bhuva, R. (2020). *A Textbook of Research Methodology*. Paradise Publishers.
6. UGC Guidelines on Plagiarism and Ethics in Research

IV Year: VIII Semester (THEORY)

Research Publication Ethics

Code: BFS803

L	T	P	C
3	0	0	3

Course objective:

1. Introduce students to the principles of ethical research practices.
2. Familiarize students with scientific misconduct and consequences of unethical behaviour.
3. Educate on plagiarism and best practices to avoid it.
4. Provide understanding of publication process and ethics in authorship.
5. Encourage responsible conduct in scientific communication and collaborative research.

Unit I: Introduction to Research Ethics

Definition and need for research ethics, Historical examples and evolution of ethical guidelines, Ethics in biological and forensic research, Code of conduct for researchers, Role of institutional ethics committees (IEC, IRB)

Unit II: Scientific Misconduct and Unethical Practices

Fabrication, falsification, and data manipulation, Conflict of interest, Authorship issues: ghost authorship, honorary authorship, Duplicate and redundant publication, Case studies of scientific misconduct

Unit III: Plagiarism and Academic Integrity

Definition and types of plagiarism, Tools to detect plagiarism (Turnitin, iThenticate, URKUND), Self-plagiarism and copyright issues, UGC and university plagiarism policies, Penalties and ethical decision-making

Unit IV: Publication Process and Ethics

Structure of a research paper (IMRaD format), Peer review process: types and importance, Journal selection and impact factor, Open access and predatory journals, Retraction, erratum, and correction in publications

Unit V: Ethics in Scientific Collaboration and Communication

Ethics in collaborative research projects, Confidentiality, data sharing, and ownership, Communication with non-scientific audiences, Responsible conduct in conferences and public forums, Role of mentor and supervisor in promoting research integrity

Suggested Readings:

1. Resnik, D.B. (2011). What is Ethics in Research & Why is it Important? National Institute of Environmental Health Sciences (NIEHS).
2. ICMR (2017). National Ethical Guidelines for Biomedical and Health Research Involving Human Participants.
3. Shamoo, A.E. & Resnik, D.B. (2009). Responsible Conduct of Research (2nd Edition). Oxford University Press.
4. Macrina, F.L. (2014). Scientific Integrity: Text and Cases in Responsible Conduct of Research (4th Edition). ASM Press.
5. Beall, J. (2016). Predatory publishers are corrupting open access. Nature.
6. UGC Guidelines on Academic Integrity and Plagiarism (2018).



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Course Learning Outcomes (CLOs): After completing this course, students will be able to:

1. Understand the fundamentals of research and publication ethics.
2. Recognize unethical research practices and prevent scientific misconduct.
3. Avoid plagiarism and follow principles of academic integrity.
4. Navigate ethical issues in the publication process and authorship.
5. Demonstrate responsible behaviour in collaborative and interdisciplinary research.



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IV Year: VIII Semester (Practical)
Advanced Digital Forensics Lab
Code: BFS851

L	T	P	C
2	0	0	1

Course Objective:

1. Apply foundational concepts of digital forensic science in laboratory-based investigations.
2. Perform forensic acquisition and analysis of digital storage and memory.
3. Use industry-standard tools for recovering, analysing, and interpreting digital evidence.
4. Understand the investigative process for network and live systems in cybercrime scenarios.
5. Prepare forensic reports and legal documentation by ethical and legal standards.

PRACTICALS:

1. Understand types of digital evidence and how to handle them.
2. Learn to interpret directory structure and metadata of common file systems.
3. Simulate the forensic steps of identification, preservation, analysis, and presentation
4. Create forensic disk images using FTK Imager.
5. Recover deleted or hidden files from a forensic image.
6. Acquire volatile memory and identify forensic artifacts.
7. Monitor and analyze live network traffic.
8. Monitor and analyze live network traffic.
9. Examine file timestamps to reconstruct user activity.
10. Use tools to reveal hidden data within images or files.

Course Learning Outcomes (CLOs): After completing this course, students will be able to:

1. Identify and handle various types of digital evidence following forensic protocols.
2. Acquire and analyze digital media using forensic imaging and recovery tools.
3. Capture and examine live network and system artifacts.
4. Recover data from slack space, timestamps, and steganographic sources.
5. Maintain the integrity of the evidence through proper documentation and reporting.
6. Interpret forensic findings and present them in a format suitable for legal proceedings.

Suggested Readings and Tools:

1. Nelson, B., Phillips, A., & Steuart, C. (2018). Guide to Computer Forensics and Investigations (6th Ed.). Cengage Learning.
2. Casey, E. (2011). Digital Evidence and Computer Crime (3rd Ed.). Academic Press.
3. Jones, K.J., Bejtlich, R., & Rose, C.W. (2006). Real Digital Forensics. Addison-Wesley.
4. Carrier, B. (2005). File System Forensic Analysis. Addison-Wesley.
5. Marcella, A.J., & Menendez, D. (2008). Cyber Forensics: A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes. Auerbach Publications.



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OR
B.Sc. Forensic Science (H) in Research

IV Year: VIII Semester (Research)
Research Project /Internship at Forensic Laboratory
Code: BFS852

L	T	P	C
0	0	24	12

Students choosing a 4 year bachelor degree (Honours with Research) are required to take up a research project under the guidance of a faculty member. The students are expected to complete the research project in last semester. The Research outcome of their project work may be published in peer reviewed journals or may be presented in conferences /seminars or may be patented.

1. **The student** will execute the plans in **the** form of results
2. Independently analyse the results and write down the discussion and conclusion
3. Project work will be presented in front of the subject expert committee
4. Prepare the thesis report
5. Published their work in a journal

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

1. Present papers and **analyse** the data obtained and write a thesis report, present a PowerPoint presentation, and write a paper for a journal
2. Design, posters and will have understanding about how to present the results in the crisp and interesting manner.
3. Have a better understanding of industrial communication and improve their skills.
4. Enhance their scientific, interpersonal communication, teamwork and readiness for industry/research organization, which will be interpreted into a good scientific human resource