



FUTURE UNIVERSITY

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FUTURE UNIVERSITY, BAREILLY

(Established under the Uttar Pradesh Private Universities (Third Amendment) Act, 2024)

COURSE CURRICULUM

AND

EVALUATION SCHEME

B.Sc. (Forensic Science)

For the Students Admitted in Academic Session 2025-26

Effective From

Academic Session 2025-26

Prepared By

Board of Studies

Approved By

**Academic Council
Future University, Bareilly**

Published By

**Office of the Registrar
Future University, Bareilly**



(This Curriculum and Evaluation Scheme shall be applicable to all students admitted to the B.Sc.(Forensic Science) Programme from the Academic Session 2025-26 onwards and shall remain in force until amended or revised by the Academic Council of Future University, Bareilly.)

Study & Evaluation Scheme

Of

B.Sc. Forensic Science (UG)

[Applicable w.e.f. Academic Session 2025-26]

Approved by UGC



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FUTURE UNIVERSITY

18th Milestone, Bareilly-Lucknow Highway NH-24

Near Faridpur, Bareilly, Uttar Pradesh 243503

Website: www.futureuniversity.in

Syllabus Applicable w.e.f. Academic Session 2025-2026

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Future University
Bareilly

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(Established under Govt. of U. P. Act No. 12, 2024)

**Study & Evaluation Scheme
of
B. Sc. Forensic Science**

SUMMARY

Syllabus Applicable w.e.f. Academic Session 2025-2026

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Rishav Singh
Dean
Faculty of Sciences
Future University
Bareilly

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Academic Council
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Syllabus for

B.Sc. Forensic Science (UG)

CHOICE BASED CREDIT SYSTEM(CBCS)

Framed According to the National Educational Policy (NEP2020)

I–VIII SEMESTERS

To implement from the academic year 2025-29

Syllabus for B.Sc. Hons. In Forensic Science

Name of the Degree Program: **B.Sc., Hons.**
Discipline Core: **Forensic Science**
Total Credits for the Program: **52/102/147/187**
Starting year of implementation: **2025-2029**

Progressive Certificate, Diploma, bachelor's
degree or bachelor's Degree with Honors
Provided at the End of Each Year of Exit of the
Four-year Undergraduate Programme

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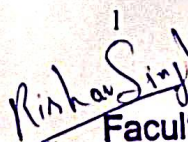
VISION

To establish knowledge creation and learning university to generate value based competent professionals and globally competitive human capital comparable with the best in the world through research driven multi-disciplinary and inter disciplinary approach, continuous learning, societal responsiveness and strategic partnership with the industry while being locally and globally responsive.

MISSION

Within a vibrant, ever challenging and supportive learning environment, Future University discovers, disseminates and applies new knowledge through teaching and learning, research and creative activity, community involvement and partnerships. The Future University shall groom individuals for the day-to-day challenges of life by developing their intrinsic human abilities, provides a skilled human resource for the job market, who would contribute to the advancement of knowledge in the larger perspective. Future University, would thus, become a channel for giving a national and international voice to innovation, thus ultimately taking a lead role in placing India on the global forefront.




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FUTURE UNIVERSITY

Shri Rajendra Kumar Gupta Memorial Trust University is at the forefront of uplifting the quality education in India for over 16 years now. By laying special emphasis on roping in highly skilled and experienced faculty and creating state-of-the-art infrastructure, Future University is relentlessly creating new benchmarks in the education sector.

Future University notified vide U.P. Govt. Notification no. 212(2) LXXIX-V-I-2024-2-ka-6-2024 Leg. Dated 02nd July 2024 and Future University (Establishment and Regulation Act, 2024) Act No. 2 of 2019. Uttar Pradesh Government Notification 212(2) LXXIX-V-I-2024-2-ka-6-2024 Leg. Dated 02nd July 2024 and approved under section amendment of scheduled 2 of U.P act no.12-2019.

The main objective of Future University is to lay emphasis on:

- ❖ Curriculum based on Industry Focus
- ❖ Delivery focuses on Learning, with Engagement and Involvement of Students
- ❖ Domain Skill, Soft Skill, Industry Interface as a part of Curriculum
- ❖ Choice Based Credit System accepted Nationally and Internationally
- ❖ Focus on Entrepreneurship Skill Development with International Exposure

At the core of the growing popularity of Future University among students and parents is the industry focus in curriculum adopted by it, which enables students to become employment-ready by the time they complete their course. The University believes in making learning effective by involving and engaging students. In line with this, students are provided with ample opportunities to apply the knowledge acquired in real life scenarios.

To help students adapt easily to the industry environment, the University has made Domain Skills, Soft Skills and Industry Interface an integral part of its Curriculum. In addition, the University aims to develop world-class Entrepreneurs with its focus on Entrepreneurship Skill Development with International Exposure.



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OUTLINES OF UNDERGRADUATE COURSES UNDER NEP 2020

Introduction

The University Grants Commission (UGC) has introduced several measures to ensure equity, efficiency, and excellence in the higher education system of India. These include reforms in curriculum design, teaching-learning methods, assessment, and governance. The National Education Policy (NEP) 2020 recognizes higher education as a vital instrument for individual growth, societal progress, and national development. It envisions India as a democratic, just, and humane nation guided by liberty, equality, and fraternity. NEP 2020 emphasizes that quality higher education must develop thoughtful, creative, and well-rounded individuals equipped with critical thinking, problem-solving, and communication skills. It promotes an integrated approach, combining the humanities, arts, and sciences for a holistic learning experience. Accordingly, the UGC has developed the Curriculum and Credit Framework for Undergraduate Programmes (CCFUP), a student-centric model featuring a flexible Choice Based Credit System (CBCS), multidisciplinary learning, and multiple entry and exit options.

Duration and Structure of Programmes

Under NEP 2020, undergraduate programmes are designed with multiple entry and exit options as follows:

Duration	Credits Required	Exit Award
1 Year (2 Semesters)	40 + 4 (Vocational Course)	UG Certificate
2 Years (4 Semesters)	80 + 4 (Vocational Course)	UG Diploma
3 Years (6 Semesters)	120	Bachelor's Degree
4 Years (8 Semesters)	160	Bachelor's Degree (Honours / Honours with Research) *

Honours with Research is awarded if the student completes a rigorous research project in the 4th year.

The 4-Year bachelor's degree Programme is the preferred option, allowing students to gain holistic and multidisciplinary education with both major and minor specializations.

Key Features of the NEP 2020 Undergraduate Framework

1. Flexibility and Choice

- Multiple Entry/Exit Points: Enables students to pause and resume studies with credit transfer options.
- Customised Learning Paths: Students can design individual academic journeys based on interests and career goals.
- Choice-Based Credit System (CBCS): Offers freedom to choose from core, elective, interdisciplinary, and skill courses.

2. Multidisciplinary and Interdisciplinary Learning

- Major-Minor System: Students pursue a *major* discipline while exploring *minor* subjects from other fields.
- Open Electives: Encourage cross-disciplinary learning to broaden perspectives.

3. Holistic and General Education

- Foundation and General Education Courses: Focus on communication, critical thinking, ethics, Indian heritage, and sustainability.

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- Skill and Vocational Education: Emphasizes employability and practical skills through hands-on learning.
- 4. Experiential and Skill-Based Learning
 - Internships, Apprenticeships, and Fieldwork: Provide practical, real-world experience.
 - Community Engagement: Links classroom learning to societal development and civic responsibility.
- 5. Technology-Enabled Education
 - Blended Learning: Integration of classroom teaching with digital tools.
 - MOOCs and Online Learning: Credits can be earned through approved online platforms.
- 6. Continuous and Comprehensive Evaluation
 - Assessment Methods: Include assignments, projects, viva-voce, presentations, and exams.
 - Holistic Evaluation: Considers both academic performance and development of values, ethics, and skills.
- 7. Promotion of Indian Languages and Values
 - Encouragement of regional languages as mediums of instruction.
 - Integration of Indian culture, ethics, and environmental awareness in curriculum.
- 8. Focus on Employability and Skills
 - Skill Enhancement Courses (SECs): Provide workforce-relevant competencies.
 - Vocational Courses: Offer industry-oriented, hands-on training.

Curriculum and Credit Framework for Undergraduate Programmes (CCFUP)

Objectives of CCFUP

- To provide broad-based and flexible education.
- To ensure multidisciplinary exposure and interdisciplinary learning.
- To promote job-oriented and skill-based education.
- To support student progression at individual pace.
- To enable credit accumulation and transfer.
- To bridge the gap between academic learning and social/professional experience.

Key Academic Terms in CCFUP

1. Academic Year: Two semesters (one odd, one even).
2. Semester: 15–16 weeks of academic work (approx. 90 teaching days).
3. Programme: A structured course of study leading to a certificate, diploma, or degree.
4. Course: A subject component (core, elective, or skill-based).
5. Credit: Unit of academic measurement (1 credit = 1 hour lecture or 2 hours practical/week).
6. Grade Point: Numerical weight assigned on a 10-point scale.
7. SGPA & CGPA: Semester and Cumulative Grade Point Averages to assess academic performance.
8. Transcript: Semester-wise grade card showing course details and grades obtained.

Categories of Courses under NEP 2020

1. Major Discipline Courses
 - Discipline Specific Core (DSC): Compulsory courses within the chosen major.
 - Discipline Specific Elective (DSE): Specialized or advanced elective courses related to the major.
2. Minor Courses
 - Interdisciplinary Minor (IDM): Courses integrating knowledge across disciplines.
 - Discipline Specific Minor (DSM): Focused study in a related or supplementary field.
3. Skill Enhancement Courses (SEC):
Practical, value-based, or skill-oriented courses promoting employability.
4. Multidisciplinary Courses (MDC):

- Courses that integrate learning across different academic fields for holistic understanding.
5. Ability Enhancement Courses (AEC):
Courses focusing on communication skills, IT literacy, environmental studies, and life skills.
 6. Value Added Courses (VAC):
Supplementary courses for personal enrichment, ethics, entrepreneurship, and industry readiness.
 7. Internships, Projects, and Dissertations:
Mandatory experiential components linking theory to real-world application.
 8. Community Service:
Engagement activities that promote social responsibility, teamwork, and leadership.
 9. Vocational Courses:
Profession-specific training to develop practical, job-ready skills.

Benefits of NEP 2020 Undergraduate Framework

- Enhanced student choice and flexibility.
- Strong focus on skills and employability.
- Development of critical thinking and creativity.
- Opportunity for research and innovation at the undergraduate level.
- Promotion of Indian values, languages, and culture.
- Provision of multiple exit and re-entry options, ensuring inclusivity and lifelong learning.

Details of pass-fail criteria (under NEP):

1. Individual components of papers should be considered separately to determine pass-fail criteria.
2. Pass mark will be 30% of the full marks of a component. For 50 marks paper: pass mark ≥ 15 ; for 25 marks paper, pass mark ≥ 8 .
3. Absence in ESE: Examinee absent in only ONE component in the ESE will be allowed to qualify to next semester with Arrear paper in that to be cleared in the next appropriate semester.
4. For DSC/DSE/SEC / DSM / IDM subjects: Theory and Practical or Tutorial papers will be considered as separate components to consider Pass-Fail criteria.
5. At least 50% of the components to be cleared up to qualify to the next semester. Rest of the components in which the candidate fails to secure the pass mark to be treated as Arrear and to be cleared in next appropriate semester.
6. Semester with Even number of components will be considered clear if the candidate secure pass mark in $(n/2)$ number of components. For example, if a particular semester consists of 8 components, a candidate must pass 4 components to qualify to the next semester.
7. Semester with odd number of components will be considered clear if the candidate secures the pass mark in $[(n + 1) / 2]$ number of components. For example, if one semester is composed of 9 components, a candidate must secure pass marks in 5 components to qualify to the next semester.

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Letter Grades and Grade Points

Score (Marks) Range	Score (Marks) Range (%)	Letter Grade	Grade Point
≥45	≥90	O (Outstanding)	10
< 45	<90	A+(Excellent)	9
≥40	≥ 80	A (Very Good)	8
< 40	< 80		
≥35	≥70	B+(Good)	7
< 35	< 70		
≥30	≥60	B (Average)	6
< 30	< 60		
≥25	≥50	C(Pass)	5
< 25	< 50		
≥20	≥40	F (Fail)	4
< 20	< 40		
≥15	≥30	AB (Absent)	0

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AIMS AND OBJECTIVES OF UG PROGRAM IN Forensic Science

- Forensic science is a critical element of the criminal justice system.
- Forensic Scientists analyze physical evidence (fingerprints, blood, hair etc.) collected from the incident scene to identify suspects.
- Forensic professionals use image modification tools to search for criminals absconding from the law for a long time.
- The uniform grading system will benefit the students to move across institutions within India to begin with and across countries.
- It will also enable potential employers to assess the performance of the candidates across the world.

Weightage for assessments

Type of Course	Formative Assessment/IA Marks	Summative Assessment Marks
Theory	30	70
Practical	30	70
Internship	30	70
Experiential Learning (Internships etc.)		

*In lieu of the research Project, two additional elective papers /Internship may be offered

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INSTITUTE NAME	FUTURE UNIVERSITY, Gausganj Sarai, Bareilly, Uttar Pradesh 243503		
PROGRAMME	B.Sc. Forensic Science (Honors)		
DURATION	Four Years Full Time (Eight Semesters)		
MEDIUM	English		
MINIMUM REQUIRED ATTENDANCE	75%		
		TOTAL CREDITS	
CREDITS	187		

ASSESSMENT						
Evaluation		Internal		External		Total
Theory		30		70		100
Practical/ Dissertations/Viva-Voce		30		70		100
Theory Evaluation (30 marks)						
Internal						
Class Test-1	Class Test-2					Total
Best one out of two						
30	30					30
Theory Evaluation (70 marks)				70		70
External						
Practical Evaluation		Experiment	Assignments	Viva	Attendance	Total
Internal Practical		20	10	0	0	30
External Practical		50	0	10	10	70
Duration of Examination		External		Internal		
		3 Hours		1.5 Hours		

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INTERNAL PRACTICAL EVALUATION (30 MARKS)

The internal evaluation would also be done by the internal examiner based on the experiment performed during the internal examination.

On the day of Examination	During Semester	
Experiment	Assignment	Total
20	10	30

EXTERNAL PRACTICAL EVALUATION (70 MARKS)

The external evaluation would also be done by the external examiner based on the experiment performed during the external examination.

Experiment	Attendance	Viva Voce	Total Experiment
50 Marks	10 Marks	10 Marks	70 Marks

To qualify the course a student is required to secure a minimum of 30% marks in aggregate including the semester examination and teacher's continuous evaluation. (i.e. both internal and external). A candidate who secures less than 30% of marks in a course shall be deemed to have failed in that course. The student should have secured at least 50 CPI in aggregate to clear the Programme.

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Credit distribution for the course
Proposed Curriculum Framework-4Years BSc. Programme - Forensic Sciences
Proposed CBCS Scheme for the Four Years UG Honours Programme:
B.Sc. (Honours) Forensic Science

Sem	Discipline Specific Core Course	Discipline Specific Elective Course	Open Elective	AECC	SEC Skill based	Value Based	Total Credits
1	1 Fundamentals of Forensic Science (4+2) 2 Inorganic Chemistry (4+2) 3 Crime and Society (4)	.	Generic Elective from the Bank (3)	1 English I (3) 2 IKS (0)	AI for Everyone (2)	Physical Education (Yoga)(1) Health and Wellness (1)	26
2	4 Crime Scene Management (4+2) 5 Basic Forensic Biology (4+2) 6 Criminal Law (4)	.	Generic Elective from the Bank (3)	English II (3)	Environmental Studies (2)	1 Physical Education (Sports)(1) 2. NCC/NSS/Cultural (1)	26
Exit option with Certificate in Forensic Science(52credits)							
3	7 Forensic Dermatology(4+2) 8 Advanced Forensic Chemistry (4+2) 9 Technological Methods in Forensic Science (4+2)	.		English III (3)	Artificial Intelligence in Forensics (2)	1 Physical Education (Sports)(1) 2 NCC/NSS/Cultural (1)	25
4	10 Questioned Documents (4+2) 11 Advanced Forensic Biology (4+2) 12 Forensic Psychology (4+2)	.		English IV (3)	Constitution of India (2)	1 Physical Education (Sports)(1) 2 NCC/NSS/Cultural (1)	25
Exit option with Diploma in Forensic Science(102credits)							
5	13 Forensic Toxicology (3+2) 14 Forensic Computing and Cyber Crime (3+2) 15 Forensic Physics (3+2)	1. Arson and Explosives (3) 2. Narcotic Drugs and Psychotropic Substances (2)	.	.	Speaker Identification and Tape Authentication (2) Forensic Audio and Video (2)	1. Physical Education (Sports)(1) 2. NCC/NSS/Cultural (1)	22
6	16 Forensic Serology (3+2) 17 Digital Forensics (3+2) 18 Forensic Ballistics (3+2) 18 Internship (2)		.	.		1 Physical Education (Sports)(1) 2 NCC/NSS/Cultural (1)	23
Exit option with Bachelor's degree in forensic science (147 credits)							
7	19 Forensic Engineering (3+2) 20 Forensic Anthropology & Odontology (3+2)	1. Wildlife Forensics /Forensic Entomology (3+2) 2. Research Methodology (3)	Entrepreneurship in Forensic Science (3)	.	.	.	21
8	21 Forensic Medicine (3+2)	1 DNA Profiling (3+2) 2 Research Project (6)	1. Forensic Accounting and Fraud Examination (3)	.	.	.	19
Award of Bachelor of Science Honours Degree, B.Sc. (Hons.) Degree in Forensic Science(187credits)							

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No.	Subjects	Theory	Practical
1.	Fundamentals of Forensic Science	BFS1101	BFS1170
2.	Inorganic Chemistry	BFS1102	BFS1171
3.	Crime and Society	BFS1103	
4.	Cell Biology (Elective)	BFS1104	
5.	Basics Of Physics (Elective)	BFS1105	
6.	English I	BFS1106	
7.	IKS	UCC1101	
8.	AI for Everyone	UCC1102	
9.	Crime Scene Management	BFS1201	BFS1270
10.	Basic Forensic Biology	BFS1202	BFS1271
11.	Criminal Law	BFS1203	
12.	Basics Of Chemistry (Elective)	BFS1204	
13.	Basics Of Math (Elective)	BFS1205	
14.	English II	BFS1206	
15.	Environmental Studies	BFS1207	
16.	Forensic Dermatoglyphics	BFS2301	BFS2370
17.	Advanced Forensic Chemistry	BFS2302	BFS2371
18.	Technological Methods in Forensic Science	BFS2303	BFS2372
19.	English III	BFS2304	
20.	Artificial Intelligence in forensic	BFS2305	
21.	Questioned Documents	BFS2401	BFS2470
22.	Advanced Forensic Biology	BFS2402	BFS2471
23.	Forensic Psychology	BFS2403	BFS2472
24.	English IV	BFS2404	
25.	Constitution of India	BFS2405	
26.	Forensic Toxicology	BFS3501	BFS3570
27.	Forensic Computing and Cyber Crime	BFS3502	BFS3571
28.	Forensic Physics	BFS3503	BFS3572
29.	Arson and Explosives	BFS3504	
30.	Speaker Identification and Tape Authentication	BFS3505	
31.	Forensic Serology	BFS3601	BFS3670
32.	Digital Forensics	BFS3602	BFS3671
33.	Forensic Ballistics	BFS3603	BFS3672
34.	Internship		
35.	Narcotic Drugs and Psychotropic Substances	BFS3604	
36.	Forensic Audio And Video	BFS3605	
37.	Forensic Engineering	BFS4701	BFS4770
38.	Forensic Anthropology & Odontology	BFS4702	BFS4771
39.	Wildlife Forensics	BFS4703	BFS4772
40.	Forensic Entomology	BFS4704	BFS4773
41.	Research Methodology	BFS4705	
42.	Entrepreneurship in Forensic Science	BFS4706	
43.	Forensic Medicine	BFS4801	BFS4870
44.	DNA Profiling	BFS4802	BFS4871
45.	Forensic Accounting and Fraud Examination	BFS4803	BFS4872
46.	Research Project		



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Meeting Agenda of Board of Studies (BoS)

Faculty of Forensic Sciences

Dated: 04/09/2025

S.No.	Point of Discussion	Sub point
1.	Approval of Scheme and Syllabus of B.Sc. Forensic Science Course (Batch 2025-2029)	• Subject code will be defined in B.Sc. Forensic Science curriculum and syllabus will be adopted as per UGC recommendations. • Year back system will be applicable as per UGC rules and regulations.

**Academic Council
Future University
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To

Date: 28/09/2025

The Vice Chancellor

Future University

Bareilly

Sub: Regarding organizing BOS

Respected Sir,

In pursuance of approving the schemes & syllabus for bachelor of Forensic Science to adapt Competency Based Education (CBE) and Project-Based Learning (PBL) system based on the recommendations by CRC and PRC reports, we are organizing a BOS on 04/10/2025 at Conference Room from 09:00 AM onwards to implement changes in syllabus.

We request you to provide permission to conduct the BOS so that we can finalize the recommended points by pre-BOS and do the necessary modifications in the scheme.

Thanking You



Prof. (Dr.) Hemendra Gautam

Dean, Future Institute of Pharmacy

Future University,

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To,

Date: 28/09/2025

Dr. Abhineet Anand,

Professor, Bahra University, Shimla Hills, Himanchal Pradesh
IFTM University Moradabad, (U.P)

Sub: Invitation as an expert in BOS of B. Sc. Forensic Science

Sir,

The Vice/Pro-Vice-Chancellor of Future University, Bareilly has approved a recommendation that you be appointed as an external expert member for the Board of Studies meeting for B. Sc. Forensic Science program of Faculty of Sciences, Future University, Bareilly. The proposed date of BOS meeting is 04/10/2025 from 09:00 AM onwards in the University Campus (Conference Room). Therefore, I am requesting you to kindly accept the invitation as the external expert in the above said meeting. The schedule of the BOS meeting is as follows:

Date: 04/10/2025

Time: 09:00 AM (Onwards)

Venue: Board Room, Future University, Bareilly.

A line of acknowledgement as acceptance will be highly appreciable.

Thanks, and Best Regards

Prof. Dr. Hemendra Gautam
Professor and Dean
Faculty of Sciences,
Future University
Bareilly, U.P., India
Mobile: 989780870

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Board of Studies

Name of Faculty: Faculty of Sciences, Future University.

Institute: Faculty of Forensic Sciences, Future University, Bareilly.

Attendance Sheet

S. No.	Name	Designation	Position	Signature
1.	Dr. Hemendra Gautam	Professor	Dean	
2.	Dr. Amary Saxena	Dean Academic	Academic Expert	
3.	Dr. Abhineet Anand	Professor	Chairperson	
4.	Mr. Vikash Kumar	Assistant Professor	Member	
5.	Mr. Munendra	Assistant Professor	Member	
6.	Mrs. Mansi Gupta	Assistant Professor	Member Secretary	

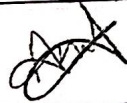
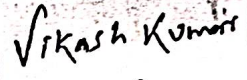
Chairman of BOS
Academic Council
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Board of Studies

Name of Faculty: Faculty of Sciences, Future University.

Institute: Faculty of Forensic Sciences, Future University, Bareilly.

Attendance Sheet

S. No.	Name	Designation	Position	Signature
1.	Dr. Hemendra Gautam	Professor	Dean	
2.	Dr. Amar Saxena	Dean Academic	Academic Expert	
3.	Dr. Abhineet Anand	Professor	Chairperson	
4.	Mr. Vikash Kumar	Assistant Professor	Member	
5.	Mr. Munendra	Assistant Professor	Member	
6.	Mrs. Mansi Gupta	Assistant Professor	Member Secretary	


 Chairman of BOS

**Academic Council
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Minutes of the Board of Studies (BOS) Meeting

Faculty of Sciences
Future University, Bareilly

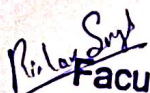
Date: 04/10/2025

Venue: Board Room

Time: 9.30 am

1. The meeting commenced with a warm welcome by **Dr. Abhineet Anand**, Chairperson of the BOS.
2. A brief overview of the agenda was presented, highlighting the key areas of discussion: Approval of Course Structure, Syllabus, Scheme, and Appointment of External Examiners.
3. The proposed course structure for Session 2025-29 BSc. Forensic Science was presented.
4. Members reviewed the proposed structure, ensuring alignment with the curriculum standards and regulatory requirements.
5. After discussion, the course structure was **approved unanimously**.
6. **Mr. Vikash Kumar** circulates the final course structure to all faculty members.
7. The syllabus for the following courses were presented for approval:
 - BSc. Forensic Science
8. Each syllabus was discussed in detail, with feedback provided by the faculty members.
9. Minor revisions were suggested in AI for All and AI for Forensic Science of the syllabus.
10. After revisions, the syllabus was **approved**.
11. **Mrs. Mansi implements** the revisions and finalizes the syllabus.
12. The proposed scheme of examination, including distribution of marks, examination pattern, and evaluation methods, was presented for the following courses:
 - B.Sc. Forensic Science
13. The scheme was reviewed by the BOS members, and the scheme was **approved**.
14. A list of potential external examiners for practical examinations and paper setting was proposed.
15. After discussing the qualifications and expertise of the proposed examiners, the list was **approved**.
16. **Mr. Munendra** sends formal invitations to the external examiners.
17. The Chairperson thanked all members for their valuable contributions and participation.
18. The Chairperson concluded the meeting, noting that the decisions made would help enhance the quality of education at the Faculty of Forensic Sciences, Future University.
19. The meeting was adjourned at 4.00 pm.




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Action Points Summary

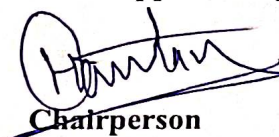
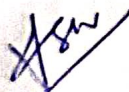
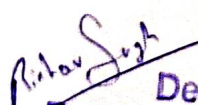
1. Mr. Vikash Kumar circulate the final course structure to all faculty members
2. Mrs. Mansi Gupta implements the revisions and finalizes the syllabus.
3. Mr. Munendra send formal invitations to the external examiners

Minutes Prepared by:



Mrs. Mansi
Assistant Professor

Minutes Approved by:


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Program Name	B.Sc.	Semester	I
Course Title	FUNDAMENTALS OF FORENSICS CIENCE		
Course Code	BFS1101	Course Credits	4
Contact Hours	56	Duration of SEA /Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Course Outcomes (COs):

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

- **CO1:** Learn the basic concepts of forensic science.
- **CO2:** Study the history of forensic science.
- **CO3:** Understand the organization of forensic laboratories.
- **CO4:** Acquire knowledge about agencies involved in crime detection and investigation.
- **CO5:** Understand the code of conduct prescribed by different establishments for forensic science.

Unit1: Concepts in forensic science	14 Hours
Definition of forensic science; scope and need of forensic science; Functions of Forensic Science; Evidence; classification of evidence: according to Indian Evidence Act, based on nature of evidence, class and individual evidence; Principles of forensic science; Frye Rule; Daubert Standards; Terminologies in forensic science: First responder, chain of custody, mahazaar; Code of conduct for forensic scientists; Qualifications of forensic scientists; Duties of forensic scientists; Data depiction; Report writing. Ethics in Forensic Science.	
Unit2: History of Forensic Science	14 Hours
Pioneers in Forensic Sciences: History and development of branches of forensic science: forensic biology, forensic chemistry and toxicology, forensic anthropology, fingerprints, Questioned document examination, forensic ballistics, digital and cyber forensics, forensic audio analysis, forensic psychology; Contribution of Sir Edgar Hoover through the FBI.	
Unit3: Organization of Forensic Science Laboratory	14 Hours
Forensic Science Laboratories in India: history, development and hierarchical set up; Directorate of Forensic Science Services, Central, State and Regional Forensic Science Laboratories; Mobile Crime Laboratories; Branches of Forensic Science Laboratories (definition and functions): Forensic Biology, DNA, Forensic Chemistry, Forensic Toxicology, Narcotics Unit, Forensic Physics, Forensic Ballistics, Forensic Psychology, Questioned Documents, Computer Forensics, Forensic Audio Analysis.	
Unit4: Agencies involved in crime detection and investigation	14 Hours
Functions and hierarchical setup of Law enforcement agencies: civil police, reserve police; Government Examiners of Questioned Documents; Fingerprint Bureaus; National Crime Records Bureau; Police & Detective Training Schools; Bureau of Police Research & Development; National and State Police Academies; Police Training Schools/Colleges, Dog Squad, Bomb Detection and Defusal Squad; RAW, CBI, INTERPOL and FBI.	

Ref. Books-

1. B.S. Nabar – *Forensic Science in Crime Investigation*
2. R. Saferstein – *Criminalistics: An Introduction to Forensic Science*
3. R.C. Sharma – *Forensic Science in Criminal Investigation and Trials*
4. Dr. B. R. Sharma – *Forensic Science in Criminal Investigation and Trials*
5. James, N., Nordby, J. J., & Bell, S. – *Forensic Science: An Introduction to Scientific and Investigative Techniques*
6. Stuart H. James & Jon J. Nordby – *Forensic Science: An Introduction to Scientific and Investigative Techniques*
7. Richard Saferstein – *Forensic Science Handbook (Vol. I-III)*
8. Henry Lee & Elaine Pagliaro – *Forensic Science: An Introduction to Scientific and Investigative Techniques*
9. H.S. Modi – *Medical Jurisprudence and Toxicology*
10. A.K. Jaiswal – *Forensic Science: Basics and Applications*

INTRODUCTION TO FORENSIC SCIENCE

Hours: 60

Course Title: Fundamentals of Forensic Science Lab	Course Credits: 02
Course Type: Core Practical, L-T-P: 0-0-4	Course Code: BFS1170
Total Contact Hours: 60	Duration of ESA: 4Hours
Formative Assessment Marks:30	Summative Assessment Marks:70

Course Outcomes (COs):

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

1. Understand crime cases and their components.
2. Learn the preparation of crime reports.
3. Acquire knowledge on fingerprint evidence.
4. Know the hierarchical setup of different forensic science establishments.
5. Understand the code of conduct prescribed by different establishments for forensic

FUNDAMENTALS OF FORENSIC SCIENCE PRACTICAL

Hours:60

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

Crime Scene Management

1. Demonstration of crime scene protection and documentation techniques.
2. Sketching of a mock crime scene (rough and final sketch).
3. Photography of a mock crime scene — close-up, mid-range, and overview shots.
4. Collection, labeling, sealing, and forwarding of different types of physical evidence.

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5. Identify and classify evidence from a given case study.
6. Apply the principle of probability on a case study with respect to one evidence.
7. Trace the use of forensic science from any one of the following cases:
 - a. Aarushi Talwar Case
 - b. Nirbhaya Case
8. Write a forensic report on a crime case from a case study.

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BASIC FORENSIC CHEMISTRY

Course Title: Inorganic chemistry	Course Code: BFS1102
Course Type: Discipline Core Theory, L-T-P:3-0-0	Course Credits:4
Total Contact Hours:45	Duration of ESA:3Hrs.
Formative Assessment Marks:30	Summative Assessment Marks:70

Course Outcomes(COs):

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

1. Learn the basic concepts of chemistry.
2. Study the periodic table – columns (groups) and rows (periods).
3. Understand the essentials of chemistry for forensic applications.
4. Enhance research skills such as critical thinking.

INORGANIC CHEMISTRY

Credits:4

Hours:45

Unit-1:	Atomic Structure: Role of Indian scientists to explain the structure of atom. Schrodinger's wave equation, significance of ψ and ψ^2 . Quantum numbers and their significance. Normalized and orthogonal wave functions. Sign of wave functions. Radial and angular wave functions for hydrogen atom. Radial and angular distribution curves. Shapes of s, p, d and f orbitals. Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations.	8 Hours
Unit-2:	Periodicity of Elements: Effective nuclear charge, shielding or screening effect, Atomic & ionic radii, Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy, Electron gain enthalpy, Electro negativity, trends in periodic table and applications in predicting and explaining the chemical behavior.	8 Hours
Unit-3:	Chemical Bonding-I: Covalent bond: Valence Bond theory & its limitations. Hybridization & shapes of simple inorganic molecules & ions, Valence shell electron pair repulsion theory (VSEPR), shapes of simple molecules and ions containing lone pairs and bond pairs of electrons, Resonance and resonance energy, Molecular orbital theory & MO diagrams of Homo & hetero nuclear (CO, NO) diatomic molecules.	8 Hours
Unit-4:	Chemical Bonding-II: Ionic Solids: Covalent character in ionic compounds, polarizing power and polarizability. Fajan's rules and consequences of polarization. Ionic character in covalent compounds: Bond moment and dipole moment. Percentage ionic character From dipole moment and electro negativity difference Ionic structures, radius ratio Effect and coordination number, limitation of radius ratio rule, lattice energy and Born-Haber cycle, solvation energy and solubility of ionic solid.	8 Hours

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Books for Reference:

1. Bahl, B. S., & Bahl, A. (2017). *A Textbook of Organic Chemistry*. S. Chand Publishing.
2. Glasstone, S. (2007). *Thermodynamics for Chemists*. Narahari Press.
3. Khopkar, S. M. (2008). *Basic Concepts of Analytical Chemistry*. New Age International.
4. Lee, J. D. (2008). *Concise Inorganic Chemistry*. John Wiley & Sons.
5. Gupta, R. R., & D. M. (1997). *Heterocyclic Chemistry: Volume II*. Springer-Verlag, Berlin Heidelberg

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INORGANIC CHEMISTRY PRACTICAL

Credits:2

Hours:60

Course Title: Basic Forensic Chemistry Lab	Course Credits: 02
Course Type: Core Practical, L-T-P:0-0-4	Course Code: BFS1171
Total Contact Hours: 60	Duration of ESA: 4Hours
Formative Assessment Marks:30	Summative Assessment Marks:70

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

1. Understand the basic principles of liquids and solids.
2. Learn the preparation of standard solutions.
3. Acquire knowledge on titrimetric analysis.
4. Know the adulteration of different essential compounds.
5. Enhance basic laboratory skills such as keen observation and analysis.

Course Outcomes (COs):

Lab Course Content

Credits:2

Hours:60

List of Experiments to be Conducted:

1. Calibration and use of apparatus.
2. Determination of boiling point of a given liquid.
3. Preparation of Normal, Molar, Standard, and buffer solutions.
4. Separation of components of a sample by liquid-liquid extraction.
5. Separation of dyes and inks / plant pigments.
6. Examination of phenolphthalein in trap cases.
7. Determination of pH of a solution using a pH meter.

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Crime and Society

Hours:45

Course Title/Code: CRIME AND SOCIETY	Course Credits:4
Course Code: BFS1103	L-T-P per week:3-0-0
TotalContactHours:45	Duration of ESA:3Hours
Formative Assessment Marks:30	Summative Assessment Marks:70

Core Course prerequisite: To study Forensic Science undergraduate, student must have studied Physics/Chemistry/Biology or equivalent subject in Class 12.

Course Outcomes (COs):

1. Analyze criminological theories and apply them to understand criminal behaviour and investigative profiling.
2. Classify different types of crimes and evaluate their social, psychological, and economic impacts on society.
3. Examine crime detection and investigation techniques and assess the role of law enforcement agencies and the criminal justice system in crime prevention and offender rehabilitation.

CRIME AND SOCIETY

Credits:3

Hours:45

Unit 1: Foundations and Theories of Criminal Behaviour

- **Introduction to Criminology:** Definition, aims, and scope.
- **Criminological Theories:** Classical, positivist, and sociological perspectives.
- **Theories of Criminal Behaviour:** Biological, physiological, psychogenic, economic, and geographical perspectives.
- **Criminal Anthropology and Profiling:** Understanding modus operandi and investigative strategies.
- **Role of Media:** Influence on crime perception and criminology.

Unit 2: Types of Crime and Criminal Behaviour

- **Elements and Nature of Crime:** Causes, consequences, and deviant behaviour.
- **Specific Crime Types:** Hate crimes, organized crimes, domestic violence, and workplace violence.
- **White Collar Crimes and Victimology:** Juvenile delinquency, social change, and psychological disorders.
- **Crime Prevention:** Situational crime prevention methods.

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Unit 3: Crime Detection, Investigation, and the Criminal Justice System

- **Crime Detection Agencies:** National Institute of Criminology and Forensic Science, Crime Investigation Department (CID), Central Bureau of Investigation (CBI), National Investigation Agency (NIA), etc.
- **Specialized Crime Detection Agencies:** Drug Enforcement Administration (DEA), INTERPOL, etc.
- **Crime Scene Investigation:** Techniques and procedures.
- **Criminal Justice System Overview:** Policing styles, power of investigation, community policing, and rehabilitation of offenders.
- **Human Rights and the Criminal Justice System in India:** Addressing human rights abuses across various sectors.

Books for Reference

1. Brown, S. E., Esbensen, F. A., & Geis, G. (2015). *Criminology: Explaining Crime and its Context* (8th Edition). Elsevier Science; Routledge.
2. Clevenger, S., Higgins, G. E., Marcum, C. D., & Navarro, J. N. (2020). *Understanding Victimology: An Active-Learning Approach*. Taylor and Francis.
3. Doerner, W., & Lab, S. P. (2012). *Victimology*. Amsterdam: Elsevier.
4. El-Dakkak, P. D. (2014). *Criminology and Penology*. Abu Dhabi: The Judicial Department.
5. Gillin, J. L. *Criminology and Penology – Volume 1*.
6. Lab, S. P. (2016). *Crime Prevention: Approaches, Practices, and Evaluations*. Routledge.
7. Pamela Davies, P. F. (2007). *Victims, Crime and Society*. SAGE.
8. Paranjpe, N. V. (2016). *Criminology and Penology*. Central Law Publications, Allahabad.
9. Shahidullah, S. M. (2017). *Crime, Criminal Justice, and the Evolving Science of Criminology in South Asia: India, Pakistan, and Bangladesh*. Palgrave Macmillan UK.
10. Thilagaraj, R. (2013). *Criminal Justice System in India*. In J. Liu, B. Heberton, & S. Jou (Eds.), *Handbook of Asian Criminology* (pp. 199–211). New York: Springer-Verlag.
11. Turvey, B. E. (2014). *Forensic Victimology: Examining Violent Crime Victims in Investigative and Legal Contexts*. Elsevier.
12. Williams, K. S. (2012). *Textbook on Criminology*. Oxford University Press, USA.

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Course Code: Forensic Science
Cell Biology

Course Title/Code: Basics of Biology	Course Credits:3
Course Code: BFS1104	L-T-P perweek:3-0-0
Total Contact Hours:45	DurationofESA:3Hours
Formative Assessment Marks:30	Summative Assessment Marks:70

<u>Course Code:</u>	DISCIPLINE MINOR COURSE FORENSIC SCIENCE SEMESTER-I CELL BIOLOGY	
Course Outcomes:	On completion of the course, the students will be:	
CO1.	Remembering the theories of cells, types of cells, concept of hierarchy of cell structure and cell molecules.	
CO2.	Understanding the cell membrane, cell wall, cellular matrix and associated terminologies.	
CO3.	Understanding the cell organelles and their specific functions.	
CO4.	Understanding the cell components and its significance in an organism.	
CO5.	Understanding the relationship between cell cycle, mitosis and meiosis.	
Course Content:		
Unit-1:	Introduction: History, Cell theory and its exceptions, Prokaryotic and Eukaryotic Cells, Plant and Animal cells, Phages, Virioids, Myco plasmas, Prions, hierarchy in cell structure and cell molecules (macromolecules, supra macromolecules, cell organelles, cells, tissues, organs, organ system).	8 Hours
Unit-2:	Cell wall, cell membrane and cellular matrix: Cell wall, distribution, chemical composition, functions and variations in prokaryotic and eukaryotic cells (primary and secondary wall), Glyco calyx, Cell- cell interactions/Junctions, pit connections in plants and animals. Cell membrane structure and functions, active and passive transport, phagocytosis, pinocytosis, exocytosis.	8 Hours

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Unit-3:	Cell organelles: Nuclear envelope, nuclear lamina, transport across nuclear membrane, Nucleolus, Structural organization and function of mitochondria, chloroplasts, lysosomes, gloxysomes and peroxisomes, biogenesis of mitochondria and chloroplasts, semiautonomous nature of mitochondria and chloroplast	8 Hours
Unit-4:	Cytoskeleton, Protein sorting and Transport: Structure and organization of actin, myosin and intermediate filaments, microtubules, and their role. Structure and functions of endoplasmic reticulum and golgi apparatus, GERL.	8 Hours
Unit-5:	Cell Cycle and Cell Division: Cell cycle, mitosis, meiosis and their significance	8 Hours
Ref. Books-	1. Bruce Alberts et al. – <i>Molecular Biology of the Cell</i> 2. Geoffrey M. Cooper & Robert E. Hausman – <i>The Cell: A Molecular Approach</i> 3. Gerald Karp – <i>Cell and Molecular Biology: Concepts and Experiments</i> 4. Dee Unglaub Silverthorn – <i>Human Physiology: An Integrated Approach</i> 5. Lodish, Berk, Zipursky et al. – <i>Molecular Cell Biology</i> 6. D. Sadava et al. – <i>Life: The Science of Biology</i> 7. Eduard Kellenberger – <i>Fundamentals of Cytology</i> 8. E.D.P. De Robertis & E.M.F. De Robertis – <i>Cell and Molecular Biology</i> 9. P.S. Verma & V.K. Agarwal – <i>Cell Biology, Genetics, Molecular Biology, Evolution and Ecology</i> 10. Alberts & Bray – <i>Essential Cell Biology</i>	

**Course Code: Forensic Science
Physics**

Course Title/Code: BASICS OF PHYSICS	CourseCredits:3
Course Code: BFS1105	L-T-P perweek:3-0-0
TotalContactHours:45	Duration of ESA:3Hours
Formative Assessment Marks:30	Summative Assessment Marks:70

Course Code:	DISCIPLINE MINOR COURSE FORENSIC SCIENCE SEMESTER-I CONCEPTS OF PHYSICS	
Course Outcomes:	On completion of the course, the students will be:	
CO1.	Remembering the distinction between a vector and a scalar.	
CO2.	Understanding the concepts of distance, displacement, speed, velocity, vector nature of Acceleration to a physical scenario.	
CO3.	Understanding the use of average acceleration equation over simple computations, a Charged object a having an imbalance of protons and electrons.	
CO4.	Understanding the relation between elastic constant, twisting torque and Kepler's law	
CO5.	Understanding the simple harmonic oscillations and its solutions	
Course Content:		
Unit1:	Kinematic Concepts: vectors, scalars, distance, displacement, velocity, speed, acceleration, oil drop representations, numerical analysis of data, and average speed, average acceleration, The scope of Physics, The role of measurement and mathematics in Physics, Physics and everyday phenomena and home experiments and observations. Contribution of Ancient Indian Scientists and their inventions for modern world.	8 Hours
Unit2:	Rotational Dynamics: Centre of Mass and Laboratory frames. Angular momentum of a particle and system of particles, Torque, Principle of conservation of angular momentum, Rotation about a fixed axis, Moment of Inertia, Calculation of moment of inertia for rectangular, cylindrical and spherical bodies, Kinetic energy of rotation, Motion involving Both translation and rotation.	8 Hours
Unit3:	Fluid Motion: Kinematics of Moving Fluids: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube. Gravitation and Central Force Motion: Law of gravitation. Gravitational potential energy, Inertial and gravitational mass, Potential and field due to spherical shell and solids sphere, Non-Inertial Systems: Non-inertial frames and fictitious forces. Uniformly rotating frame, Centrifugal force, Coriolis force.	8 Hours
Unit4:	Elasticity: Relation between Elastic constants, Twisting torque on a Cylinder or Wire. Central Forces: Motion of a particle under a central force field. Two-body problem and its reduction to one-body problem and its solution, Kepler's Laws, Satellite in circular orbit And applications. Geo synchronous orbits. Weightlessness,	8 Hours
Unit5:	Oscillations-I: SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution, Kinetic energy, potential energy, total energy and their time-average values,	8 Hours

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TextBook:	1. Mechanics, Berkeley Physics, vol.1, C. Kittel, W. Knight, et al. Tata McGraw-Hill. 2. Fundamentals of Physics, D Halliday, R Resnick, J Walker, John Wiley And Sons (1997).	
Reference Books:	1. Introduction To Physics, John D Cutnell, K. W. Johnson, D Young, S Stadler. Wiley India Edition, (2015). 2. Feynman Lectures, R. P. Feynman, R. B. Leighton, M. Sands, Pearson Education 2006. 3. Mechanics, D.S.Mathur, S.Chand and Company Limited, University Physics. *Latest editions of all the suggested books are recommended.	

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Course Title/Code: Indian Knowledge System	CourseCredits:2
Course Code: UCC1101	L-T-P perweek:3-0-0
TotalContactHours:45	Duration of ESA :3Hours

Course Code: Forensic Science
INDIAN KNOWLEDGE SYSTEM

Course Code:	VALUE ADDED COURSES FORENSIC SCIENCE SEMESTER-I INDIAN KNOWLEDGE SYSTEM	
Course Outcomes:	On completion of the course, the students will be:	
CO1.	Understanding Indian Civilization, Geography, Natural Resources & Culture.	
CO2.	Understanding Constitution of India	
CO3.	Understanding & applying the contribution of Bharat Varshain Mathematics & other Sciences to the present age.	
CO4.	Understanding and applying ideals of Indian Philosophy In their life.	
CO5	Understanding origin of Medicine & importance of Environment.	
Unit-1:	BHARATVARSHA–THE LAND OF CIVILIZATION & CULTURE: The Aryavart, Indus Valley Civilization, Harappa, Mohenjo-Daro, Fine Arts & Dance Forms, Varnashrama System, Education System, Occupations & Rituals. RICH GEOGRAPHY: Mountains, Rivers, Deserts, Coast Line, Soil Types, Natural Resources, Minerals, Seasons & Weathers, Agriculture & Major crops.	6Hours
Unit-2:	BHARATVARSHA–CONSTITUTION OF INDIA: Drafting of Constitution, Drafting Committee, Articles & amendments, Fundamental duties, Fundamental Rights, Creation of States& Union Territories, Appointment of The President & Governor, Prime Minister & Chief Minister, Upper House & Lower House in Parliament, Appointment of Supreme Court Judges, High Court Chief Justice & Chief Justice of India.	6 Hours
Unit-3:	BHARATVARSHA–LAND OF SCIENCE, MATHEMATICS, ASTRONOMY & ASTROLOGY: Vedic Mathematics, Contribution of Ancient Indian Mathematicians, Scientists & thinkers to the modern age of Science, Mysteries of Astronomy and Astrology as per ancient Indian literature.	6 Hours

Unit-4:	BHARATVARSHA- VEDAS, UPNISHADS, EPICS- Indian Education System, Languages, Elementary idea of all 4 Vedas & Upanishads & their teachings, Schools of Vedic Philosophy.	6 Hours
Unit-5:	BHARATVARSH-HEALTH & ENVIRONMENT: Health& Disease, description in Vedas, Ayurveda- Charaka, Surgery- Susruta, Yoga- Patanjali. Importance of Environment & Message to Protect Environment as per Vedas.	6 Hours
TextBook	1. Mahadevan, B.,RajatBhai,Vinayak&NagendraPavana, R.N., "Introduction to Indian Knowledge System". 2. Jha, Amit,"Traditional Knowledge System in India". Pole, Prashant, "Treasure Trove of Indian Knowledge". 3. Chauhan, Bhag Chand,"IKS The Knowledge System of Bhrata.	

Course Code: Forensic Science
ENGLISH

Course Title/Code: ENGLISH	CourseCredits:3
Course Code: BFS1106	L-T-Pperweek:3-0-0
TotalContactHours:45	DurationofESA:3Hours
Formative Assessment Marks:30	Summative Assessment Marks:70

Unit 1: Basics of English Grammar

- Parts of Speech – nouns, pronouns, verbs, adjectives, adverbs, prepositions, conjunctions, interjections
- Usage of Tenses – present, past, future, continuous forms
- Subject–Verb Agreement rules
- Types of Sentences – simple, compound, complex
- Common grammatical errors and correction exercises

Unit 2: Vocabulary Building

- Synonyms and Antonyms with examples
- Idioms and their use in conversations
- Phrasal Verbs – academic and daily life usage
- Collocations for natural expression
- Word Formation – prefixes, suffixes, compounding

Unit 3: Listening Skills

- Listening to classroom lectures and note-taking
- Understanding everyday conversations
- Audio-visual listening practice for accent and tone
- Developing concentration and memory in listening tasks

Unit 4: Speaking Skills

- Self-introduction and greetings
- Role plays in practical situations
- Everyday conversations for fluency
- Telephone etiquette and polite expressions

Unit 5: Writing Skills

- Paragraph writing with coherence
- Informal letters and emails
- Descriptive writing on events, places, and people

List of Reference Books

1. Wren, P.C. & Martin, H. *High School English Grammar and Composition*. S. Chand & Company.
2. Murphy, Raymond. *English Grammar in Use*. Cambridge University Press.
3. Sasikumar, V., Dutta, P. K. & Rajeevan, G. *A Course in Listening and Speaking I & II*. Foundation Books.
4. Taylor, Grant. *English Conversation Practice*. McGraw-Hill Education.
5. Thorpe, Edgar. *Objective English*. Pearson Education.
6. Leech, Geoffrey & Svartvik, Jan. *A Communicative Grammar of English*. Longman.
7. Freeman, Diane Larsen. *The Grammar Book: An ESL/EFL Teacher's Course*. Heinle & Heinle Publishers.
8. Krishnaswamy, N. & Sriraman, T. *Current English Grammar and Usage with Composition*. Macmillan Publishers India.

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Course Code: Forensic Science
AI for Everyone

CourseTitle/Code: AI for Everyone	CourseCredits:2
CourseCode: UCC1102	L-T-Pperweek:3-0-0
TotalContactHours:45	DurationofESA:3Hours
FormativeAssessmentMarks:30	SummativeAssessmentMarks:70

Course Objectives:

- Understand the fundamental concepts and evolution of Artificial Intelligence.
- Learn about intelligent agents, problem-solving techniques, and search strategies.
- Explore knowledge representation, reasoning, and machine learning basics.
- Familiarize with natural language processing, computer vision, and robotics.
- Examine ethical, legal, and societal implications of AI in the modern world.

Unit I: Introduction to Artificial Intelligence (12 Hours)

- Definition and history of AI
- Turing Test and its significance
- Applications of AI in daily life, industry, and governance
- AI vs. Human Intelligence
- Intelligent agents: types and structure

Unit II: Problem Solving and Search Techniques (12 Hours)

- Problem formulation and state space representation
- Uninformed search strategies:
 - Breadth-First Search (BFS)
 - Depth-First Search (DFS)
 - Uniform-cost search
- Informed search strategies:
 - Heuristic search
 - A* algorithm
 - Hill climbing
- Constraint satisfaction problems

Unit III: Knowledge Representation and Reasoning (10 Hours)

- Approaches to knowledge representation:

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- Propositional logic
- Predicate logic
- Semantic networks, frames, and ontologies
- Inference methods:
 - Forward chaining
 - Backward chaining
- Reasoning under uncertainty:
 - Bayesian networks
 - Fuzzy logic

Unit IV: Machine Learning Foundations (12 Hours)

- Introduction to machine learning
- Supervised learning:
 - Regression
 - Classification
- Unsupervised learning:
 - Clustering (k-means, hierarchical)
- Reinforcement learning basics
- Applications of ML in AI

Unit V: Emerging Areas and Ethical Aspects (10 Hours)

- Basics of Natural Language Processing (NLP)
- Overview of Computer Vision and Robotics
- AI applications in healthcare, education, and smart cities
- Ethical issues in AI: bias, transparency, accountability
- Future of AI and responsible innovation

List of Reference Books

1. Russell, Stuart & Norvig, Peter. *Artificial Intelligence: A Modern Approach*. Pearson Education.
2. Rich, Elaine, Knight, Kevin & Nair, Shivashankar B. *Artificial Intelligence*. Tata McGraw-Hill.
3. Alpaydin, Ethem. *Introduction to Machine Learning*. MIT Press.
4. Mitchell, Tom M. *Machine Learning*. McGraw-Hill Education.
5. Patterson, Dan W. *Introduction to Artificial Intelligence and Expert Systems*. Prentice Hall of India.
6. Nilsson, Nils J. *Artificial Intelligence: A New Synthesis*. Morgan Kaufmann Publishers.
7. Rajasekaran, S. & Vijayalakshmi Pai, G.A. *Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications*. Prentice Hall of India.

CRIME SCENE MANAGEMENT

Hours: 45

Course Title: Crime Scene Management	Course Code: BFS1201
Course Type: Discipline Core Theory, L-T-P:3-0-0	Course Credits:4
Total Contact Hours:45	Duration of ESA:3Hrs.
Formative Assessment Marks: 30	Summative Assessment Marks: 70

Course Outcomes(COs):

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

1. Learn the basic concepts of crime scenes.
2. Study the types of evidence found in crime scenes.
3. Understand the safety considerations while handling evidence.
4. Acquire knowledge about agencies involved in crime detection and investigation.

CRIME SCENE MANAGEMENT

Hours:45

Unit 1: Introduction to Crime Scene (15 hours)

- **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 the scene, statements of victims, witnesses, suspects, use of databases and records, officer safety, release of scene to appropriate authorities.
- **Types of Evidence Found in the Crime Scene:** Physical evidence, biological evidence, digital evidence, individual evidence, class evidence.
- **Evaluation of 5Ws and 1H:** Who? What? When? Where? Why? How?
- **Role of Different Agencies in Crime Scene Management:** Police, Forensic Science Laboratories, Medico-legal experts, Judicial officers.

Unit 2: Crime Scene Investigation (10 hours)

- Securing the crime scene.

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- Evaluating the crime scene.
- Preliminary walk-through and documentation of the crime scene.
- Search and seizure at 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 (wide-range, mid-range, close-up), sketching (rough and final sketch using triangulation, baseline, polar coordinate methods), videography, 3D crime scene mapping, contemporaneous notes.
- Identifying and listing evidence along with their evidentiary value.

Unit 3: Collection and Preservation of Evidence (10 hours)

- 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 at the crime scene.
- Forwarding evidence to the Forensic Science Laboratory.
- Maintaining **Chain of Custody**.

Unit 4: Special Crime Scenes and Crime Scene Reconstruction (10 hours)

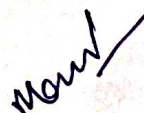
- **Special Crime Scenes:** Arson, mass disasters, road traffic accidents, wildlife crime; scene management and evidence collection for identification.
- **Crime Scene Reconstruction:** Introduction, importance, nature, principles, stages: data collection, conjecture, hypothesis formulation, testing, theory formation.
- **Equipment:**
 - Crime Scene Investigation Kit
 - Alternate Light Source
 - ABFO Scales, Placards
 - Fingerprint Detection Kit
 - Barricading Equipment
 - Evidence Tags
 - Sniffer Dogs
 - Packaging Equipment
 - ESDA, GPR (Ground Penetrating Radar), RUVIS
 - HAZMAT Suits, Personal Protective Equipment, Product Safety Equipment

Books for Reference

1. Cooper, J. E., & Cooper, M. E. (2013). *Wildlife Forensic Investigation: Principles and Practice*. CRC Press.
2. Everett, J. B. (2015). *Complete Crime Scene Investigation Handbook*. CRC Press.
3. Fisher, B. A., & Fisher, D. (2012). *Techniques of Crime Scene Investigation* (8th Edition). CRC Press.
4. Huffman, J. E., & Wallace, J. R. (2012). *Wildlife Forensics: Methods and Applications* (Vol. 6). Wiley-Blackwell.
5. James, S. H., Nordby, J. J., & Bell, S. (2014). *Forensic Science: An Introduction to Scientific and Investigative Techniques* (4th Edition). CRC Press.
6. Linacre, A. (2009). *Forensic Science in Wildlife Investigations*. Taylor & Francis.
7. Ogle, R. R., & L., S. (2017). *Crime Scene Investigation and Reconstruction*. Pearson.
8. Shaler, R. C. (2011). *Crime Scene Forensics: A Scientific Method Approach*. CRC Press.
9. Bevel, T., & R., M. (2012). *Bloodstain Pattern Analysis with an Introduction to Crime Scene Reconstruction*. CRC Press.
10. Turvey, B. E. (2011). *Criminal Profiling, Fourth Edition: An Introduction to Behavioural Evidence Analysis*. Academic Press.
11. Turvey, B. E. (2014). *Forensic Victimology: Examining Violent Crime Victims in Investigative and Legal Contexts*. Elsevier.

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CRIME SCENE MANAGEMENT PRACTICAL

Credits:02

Hours: 60

Course Title: Crime Scene Management Practical	Course Credits:02
CourseType: Core Practical, L-T-P:0-0-4	Corse Code: BFS1270
TotalContactHours:60	Duration of ESA: 4Hours
Formative Assessment Marks: 30	Summative Assessment Marks: 70

Course Objective:

To ensure students understand the techniques of securing and searching the scene of crime and collection and preservation of evidence.

Course Outcomes:

After completing this course, the students will be able to:

- Demonstrate the techniques of securing and searching indoor and outdoor crime scenes.
- Sketch crime scenes using baseline and triangulation techniques.
- Use the best techniques for the collection and preservation of evidence from the crime scene.
- Predict the series of events of a simulated crime by performing crime scene reconstruction

CRIME SCENE MANAGEMENT PRACTICAL

Credits:02

Hours:60

- Secure and evaluate indoor and outdoor crime scenes.
- Search indoor crime scenes using the spiral technique and list evidence.
- Search outdoor crime scenes using the grid search technique.
- Photograph the crime scene including at least five pieces of evidence.
- Sketch indoor crime scenes using the baseline method.
- Sketch outdoor crime scenes using the triangulation method.
- Make contemporaneous notes while investigating a crime scene.
- Collect, preserve, seal, and forward soil samples from the crime scene.
- Collect, preserve, seal, and forward blood samples from the crime scene.
- Perform crime scene reconstruction of a simulated murder or burglary scene.

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BASIC FORENSIC BIOLOGY

Hours: 45

Course Title: Basic Forensic Biology	Course Code: BFS1202
Course Type: Discipline Core Theory, L-T-P:3-0-0	Course Credits:4
Total Contact Hours:45	Duration of ESA : 3Hrs.
Formative Assessment Marks: 30	Summative Assessment Marks: 70

Course Outcomes(COs):

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

1. Understand the differences between plant and animal cells.
2. Study the classification of Kingdom Plantae and Kingdom Animalia.
3. Be familiar with the organs and tissues of the human body.
4. Learn the basics and essentials of microbiology.
5. Understand the concept of inheritance, chromosomal karyotyping, and types of mutations

BASIC FORENSIC BIOLOGY

Hours:45

Unit 1: Plant and Animal Biology (10 hours)

- **Cell:** Organelles and their functions; differences between Eukaryotic and Prokaryotic cells; differences between plant and animal cells.
- **Cell Division:** Definition, types; difference between somatic and germinal cells; totipotency and apoptosis; meiosis and mitosis.
- **Plants:** Algae, Bryophyta, Pteridophyta, and Gymnospermae.
- **Animals:** Non-chordates and chordates.
- **Forensic Aspects of Botany:** Palynology and limnology.
- **Forensic Aspects of Entomology and Post Mortem Interval.**

Unit 2: Human Biology (15 hours)

- **Elementary Tissues of the Body:** Epithelial, muscular.
- **Integumentary System:** Definition and formation of skin; layers of skin (overall anatomy); glands associated with skin.
- **Organization of Organs and Systems in the Human Body:** Digestive, circulatory, respiratory, excretory, nervous, skeletal, and reproductive systems.

Unit 3: Microbiology (10 hours)

- **Microbes**
- **Bacteria:** Classification; Gram staining; diseases and prevention; antibiotics.

- **Virus:** Classification; diseases and prevention.
- **Fungi:** Classification; diseases and prevention.
- **Parasites:** Classification; diseases and prevention.
- **Beneficial Microbes**
- **Forensic Aspects of Microbiology**
- **Biological Warfare**

Unit 4: Genetics and Inheritance (10 hours)

- **Heredity and Variation**
- **Mendelian Inheritance**
- **Chromosomes and Genes**
- **Karyotyping:** Banding techniques
- **DNA and RNA**
- **MtDNA:** Structure, types, replication
- **Eukaryotic Gene Expression:** Central Dogma
- **Mutations:** Polymorphism and significance in forensics

Books for Reference

1. Agarwal, (2018). *Modern Textbook of Botany*. Universal Publication.
2. Ananthanarayanan, (2017). *A Textbook of Microbiology*. The Orient Blackswan.
3. Gennard, D. (2013). *Forensic Entomology: An Introduction*. Wiley.
4. Gunn, A. (2006). *Essentials of Forensic Biology*. Chichester: John Wiley & Sons, Ltd.
5. Gunn, A. (2011). *Essential Forensic Biology*. John Wiley & Sons.
6. Pelczar, M. (2001). *Microbiology*. McGraw Hill Education.
7. Saferstein, R. (2004). *Forensic Science Handbook; Vol. III*. New Jersey: Prentice Hall.
8. Talwar, G. P. (2002). *Textbook of Biochemistry and Human Biology*. Prentice Hall India Learning Private Limited.
9. Verma, P. S. (2004). *Cell Biology, Genetics, Molecular Biology, Evolution and Ecology*. S. Chand.

BASIC FORENSIC BIOLOGY PRACTICAL

Credits:2

Hours:60

Course Title: Basic Forensic Biology Practical	Course Credits:2
Course Code: BFS1271	L-T-P per week:0-0-4
Total Contact Hours:60	Duration of ESA:4Hours
Formative Assessment Marks:20	Summative Assessment Marks: 80

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

1. Use simple and compound microscopes.
2. Prepare stained slides to observe plant and animal cells.
3. Be familiar with microbes and bacterial culture.
4. Learn about epithelial cells.
5. Become familiar with the basic components of blood

CourseOutcomes(COs):

BASIC FORENSIC BIOLOGY PRACTICAL

LabCourse Content

List of experiments to be conducted

Credits:2

Hours: 60

1. Microscopic examination of a plant cell.
2. Microscopic examination of an animal cell.
3. Examination of plant pollen.
4. Examination of bacteria using culture media.
5. Gram staining on various cultures.
6. Mounting and microscopic examination of human epithelial cells.
7. Mounting and microscopic examination of human hair.
8. Microscopic examination of blood cells.
9. Karyotype analysis using ideograms.
10. Extraction and examination of diatoms.
11. Examination of plant products (flower, seed, bark, leaves).

Course Title: Criminal Law	Course Credits:3
Course Code: BFS1203	L-T-P per week:0-0-4
Total Contact Hours:60	Duration of ESA:4Hours
Formative Assessment Marks: 30	Summative Assessment Marks: 70

CRIMINAL LAW

Hours:45

UNIT I: Introduction to the Criminal Justice System (08 hours)

- **Criminal Justice System (CJS):** Meaning, purpose, and social relevance
- **Legislative Process** in the criminal justice system
- **Systems of Criminal Justice:** Adversarial and inquisitorial systems
- **Coordination in CJS**
- **Reforms in CJS:** Malimath Committee Report
- **Fundamental Elements in Judicial Functioning:**
 - Due process
 - Speedy trials
 - Access to justice
- **Hierarchy of Courts in India**
- **Alternative Dispute Resolution System (ADRS):**
 - Arbitration
 - Mediation and counselling
 - Lok Adalats
 - Mahila courts
- **Restorative Justice**

UNIT II: Fundamentals of Criminal Law and Court Procedures

- **Elements of Crime:** Actus Reus & Mens Rea
- **Elements of Criminal Liability**
- **Principles of Group Liability:** Sections
- **Offences Against Human Body:**
 - Hurt, grievous hurt, culpable homicide, murder
 - Dowry death, kidnapping, abduction, rape, acid attack
- **Offences Against Property:**
 - Theft, robbery, dacoity, cheating, criminal breach of trust
- **Constitution of Criminal Courts and Functionaries**
- **Arrest:** Meaning and purpose
 - Arrest with/without a warrant
 - Arrest of a woman
 - Arrest by a private person
- **Search and Seizure**

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- **Framing of Charge:** Form and content
- **Separate Charges for Distinct Offences**
- **Trials:**
 - Trial before a court of sessions
 - Trials of warrant cases and summons cases
 - Summary trials
- **Judgment, Appeal, Reference, Revision, and Transfer of Cases**
- **Chemical Examiner's Report**

UNIT III: Laws

(12 hours)

Introduction, Sections of Bhartiya Sakshya Sanhita: 26, 39, 40, 41, 51, 53, 55, 72, 140, 141, 162,

Sections of Nagarik Suraksha Sanhita: 51, 52, 53, 326, 328, 329, 349.

Sections of Bhartiya Nyaya Sanhita: Offences against person: 63, 80, 100, 101, 103, 108, 114, 116, 117, 126, 127, 130, 137, 138

Offences against property: section 303, 308, 309, 316.

Criminal Justice System: Structure of Police, Police and Forensic Scientist relationship with reference to Crime Investigation, Modus Operandi and its role in Crime Record, maintenance of crime records, Prosecution and Judicial Organizations. Courts in India, Jurisdiction of courts in criminal cases and FIR. Court testimony: Admissibility of expert testimony, pre court preparation and court appearance, examination in chief, cross-examination and re-examination

UNIT IV: Law of Evidence and Minor Acts (10 hours)

- **Indian Evidence Act:** Introduction and types of evidence
- **Burden of Proof**
- **Relevancy and Admissibility of Facts, Admissions, and Confessions**
- **Relevancy of Confessions and Dying Declarations**
- **Expert Opinion:**
 - Appreciating expert evidence in court
 - Expert witness, cross-examination, and re-examination of witnesses
- **Minor Acts:**
 - Protection of Children from Sexual Offences Act (POCSO), 2012
 - Protection of Women from Domestic Violence Act, 2005
 - Juvenile Justice (Care and Protection of Children) Act, 2015

Books for Reference

1. Dhirajlal, R. A. (2020). *The Indian Penal Code*. LexisNexis.
2. Malimath, D. J. (2003, March). *Committee on Reforms of Criminal Justice System*.

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3. Pillai, P. (2017). *Criminal Law*. LexisNexis.
4. Pillai, K. (2019). *R. v. Kelkar's Lectures on Criminal Procedure including Probation and Juvenile Justice*. EBC Eastern Book Company.
5. Thilagaraj, R. (2013). *Criminal Justice System in India*, in B. H. Jianhong Liu, *Handbook of Asian Criminology* (pp. 199–211). Springer-Verlag.
6. Report of the Review Committee on the Recommendations of National Police Commission on Police Reforms (2005, March).
7. *The Code of Criminal Procedure*, 1973
8. *The Indian Evidence Act*, 1872
9. *The Indian Penal Code*, 1860
10. *The Juvenile Justice (Care and Protection of Children) Act*, 2015
11. *The Protection of Children from Sexual Offences Act*, 2012
12. *The Protection of Women from Domestic Violence Act*, 2005

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Course Title: Basics Of Chemistry	Course Credits:3
Course Code: BFS1204	L-T-P per week:0-0-4
Total Contact Hours:60	Duration of ESA:4Hours
Formative Assessment Marks: 30	Summative Assessment Marks: 70

Course code : Basics Of Chemistry

Unit 1: Chemical Thermodynamics (8 Hours)

- Basic concepts of system and surroundings, types of systems (open, closed, isolated)
- State functions and path functions: internal energy, enthalpy
- First Law of Thermodynamics and applications
- Heat capacity, specific heat, enthalpy changes in chemical processes
- Second Law of Thermodynamics: entropy and spontaneity
- Gibbs free energy and criteria for spontaneity

Unit 2: Chemical Equilibrium (8 Hours)

- Concept of equilibrium in physical and chemical processes
- Law of mass action and equilibrium constant (K_c , K_p)
- Relationship between K_c , K_p , and K_x
- Factors affecting equilibrium: Le Chatelier's principle
- Ionic equilibrium: strong and weak electrolytes, ionization of water, pH concept
- Buffer solutions and their applications in daily life

Unit 3: Chemical Kinetics (8 Hours)

- Introduction and scope of chemical kinetics
- Rate of reaction, rate laws, order and molecularity of a reaction
- Integrated rate equations for zero, first and second-order reactions
- Half-life period and its significance
- Factors affecting reaction rates (temperature, pressure, catalyst, concentration)
- Arrhenius equation and activation energy

Unit 4: Coordination Chemistry (8 Hours)

- Werner's theory of coordination compounds

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- Nomenclature of coordination complexes (IUPAC rules)
- Coordination number and ligands (types: monodentate, bidentate, chelating agents)
- Isomerism in coordination compounds (structural and stereoisomerism)
- Bonding theories: Valence Bond Theory (VBT) basics
- Applications of coordination compounds in medicine and industry

Unit 5: Environmental & Applied Chemistry (8 Hours)

- Water chemistry: hardness of water, determination methods (EDTA method), water softening
- Air pollution: oxides of nitrogen, Sulphur, carbon monoxide – sources and effects
- Green chemistry: principles and Applications in Pollution Reduction
- Introduction to nanomaterials and their uses
- Basics of bioinorganic chemistry: role of metals in biological systems (Fe in hemoglobin, Mg in chlorophyll)
- Everyday applications of inorganic chemistry (detergents, fertilizers, alloys)

Books for Reference

1. Lee, J. D. – *Concise Inorganic Chemistry* (John Wiley & Sons)
2. Bahl, B.S. & Bahl, A. – *Textbook of Organic Chemistry* (S. Chand Publishing)
3. Skoog, D.A., Holler, F.J., & Crouch, S.R. – *Principles of Instrumental Analysis* (Cengage Learning)
4. Atkins, P. & De Paula, J. – *Physical Chemistry* (Oxford University Press)
5. Glasstone, S. – *Thermodynamics for Chemists* (Narahari Press)

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Course Title: Basics Of Mathematics	Course Credits:3
Course Code: BFS1205	L-T-P per week:0-0-4
Total Contact Hours:60	Duration of ESA:4Hours
Formative Assessment Marks: 30	Summative Assessment Marks: 70

Course Objective:

To provide students with fundamental mathematical skills necessary for forensic analysis, data interpretation, and problem-solving in forensic science applications.

Unit 1: Number Systems and Algebra (10 Hours)

Topics:

- Real numbers, integers, fractions, decimals, percentages
- Ratio and proportion
- Basic algebraic operations
- Simplification of expressions, factorization
- Linear equations in one and two variables

Forensic Application:

- Calculating drug concentrations, dilution factors, and ratios in chemical analysis
- Solving equations for forensic sample analysis

Unit 2: Statistics and Data Interpretation (12 Hours)

Topics:

- Collection and presentation of data (tables, charts, graphs)
- Measures of central tendency: Mean, Median, Mode
- Measures of dispersion: Range, Variance, Standard Deviation
- Probability basics

Forensic Application:

- Interpretation of crime statistics
- Analysis of experimental data in forensic labs
- Probability of evidence occurrence

Unit 3: Geometry and Trigonometry (10 Hours)

Topics:

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- Basics of geometry: Lines, angles, triangles, circles
- Perimeter, area, and volume calculations
- Trigonometric ratios (sin, cos, tan) and their applications
- Simple problems involving right-angled triangles

Forensic Application:

- Reconstruction of crime scenes
- Calculating trajectories in forensic ballistics
- Estimation of body dimensions or injury angles

Unit 4: Matrices and Determinants (8 Hours)

Topics:

- Introduction to matrices and types
- Operations on matrices: Addition, subtraction, multiplication
- Determinants and inverse of a matrix
- Solving linear equations using matrices

Forensic Application:

- DNA sequence analysis
- Forensic image processing and pattern recognition
- Solving multiple-variable forensic calculations

Unit 5: Graphs, Functions, and Measurement (10 Hours)

Topics:

- Types of graphs: Line graph, bar chart, histogram, scatter plot
- Functions and their representation
- Units of measurement, conversion, accuracy, and precision
- Basic concepts of logarithms and exponential functions

Forensic Application:

- Graphical representation of chemical reactions or crime data
- Measurement analysis in toxicology
- Understanding decay rates, growth curves in biological evidence

Reference Books

1. **Higher Algebra** – Hall & Knight
2. **Elementary Algebra and Trigonometry** – S. K. Stein, K. L. Bansal
3. **Mathematics for Biological Sciences** – R. C. Gupta
4. **Introductory Statistics** – Prem S. Mann
5. **Mathematics for Forensic Science** – K. Jayadevan

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Course Title: English II	Course Credits:3
Course Code: BFS1206	L-T-P per week:0-0-4
Total Contact Hours:60	Duration of ESA:4Hours
Formative Assessment Marks: 30	Summative Assessment Marks: 70

English II

Reading & Writing for Academic Purposes

Unit 1: Reading Skills

- Comprehension practice of academic texts
- Skimming and scanning techniques
- Summarizing and paraphrasing texts
- Note-making strategies for effective learning

Unit 2: Advanced Grammar

- Clauses and sentence construction
- Transformation of Active and Passive voice
- Conversion of Direct and Indirect speech
- Effective use of connectors in writing

Unit 3: Speaking Skills

- Group discussions to enhance communication
- Extempore speaking exercises
- Storytelling activities to improve narrative skills
- Pronunciation drills for clarity and accuracy

Unit 4: Writing Skills

- Essay writing: descriptive, argumentative, and narrative
- Precis writing for concise expression
- Formal report writing techniques
- Drafting notices, circulars, and meeting agendas

Unit 5: Introduction to Literature

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- Reading and analysis of selected short stories
- Appreciation of selected poems
- Understanding basic literary terms:
 - Plot
 - Character
 - Imagery
 - Theme

Reference Books

1. **Academic Writing: A Handbook for International Students** – Stephen Bailey
2. **English for Media Studies** – Paul MacIntyre & Louise Phillips
3. **Creative Writing: A Beginner's Guide** – Julia Bell & Paul Magrs
4. **Professional Communication** – Aruna Koneru
5. **English for Competitive Examinations** – R. S. Aggarwal
6. **Research Writing Skills: A Handbook** – James Hartley
7. **The Elements of Style** – William Strunk Jr. & E. B. White

Course Title: Environmental Studies	Course Credits:2
Course Code: BFS1207	L-T-P per week:0-0-4
Total Contact Hours:60	Duration of ESA:4Hours
Formative Assessment Marks: 30	Summative Assessment Marks: 70

Environmental Studies

Course Title: Environmental Studies

Course Objective:

To provide students with fundamental knowledge of environmental concepts, issues, and management, with relevance to forensic science and public health.

Unit 1: Introduction to Environmental Science (8 Hours)

- Definition, scope, and importance of environmental science
- Interdisciplinary nature of environmental studies
- Components of environment: Atmosphere, hydrosphere, lithosphere, biosphere
- Ecosystem concept and types of ecosystems

Forensic Application: Understanding environmental factors affecting crime scenes, degradation of evidence.

Unit 2: Natural Resources and Their Management (10 Hours)

- Renewable and non-renewable resources
- Water, soil, forest, mineral, and energy resources
- Conservation strategies and sustainable management
- Human impact on natural resources

Forensic Application: Environmental sampling, water and soil analysis in forensic cases.

Unit 3: Pollution and Environmental Degradation (12 Hours)

- Types of pollution: Air, water, soil, noise, and radioactive
- Sources and effects of pollution on humans and ecosystems
- Solid waste management and hazardous waste disposal
- Environmental laws and regulations (basic overview)

Forensic Application: Identifying pollutants, tracing contamination in forensic investigations.

Unit 4: Environmental Health and Safety (10 Hours)

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- Occupational health hazards and toxic substances
- Public health and environmental hygiene
- Safety measures and personal protective equipment (PPE)
- Role of forensic experts in environmental crime investigation

Forensic Application: Assessing exposure to toxins, chemical spills, and health hazards.

Unit 5: Environmental Conservation and Sustainable Development (10 Hours)

- Biodiversity: Importance, threats, and conservation strategies
- National parks, wildlife sanctuaries, and protected areas
- Sustainable development goals (SDGs) and their relevance
- Community participation in environmental conservation

Forensic Application: Environmental crime detection, wildlife forensics, and eco-law enforcement.

Reference Books

1. **Environmental Science: Principles and Practices** – R. Rajagopalan
2. **Textbook of Environmental Studies** – Erach Bharucha
3. **Fundamentals of Environmental Studies** – R. K. Sharma & B. K. Sharma
4. **Environmental Science** – Daniel B. Botkin & Edward A. Keller
5. **Introduction to Environmental Science** – Cunningham & Cunningham

SEMESTER-III

Program Name	B.Sc. Forensic Science	Semester	III
Course Title	FORENSIC DERMATOGLYPHICS		
Course Code	BFS2301	Course Credits	4
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

After successful completion of the course, the student will be able to:

- **CO1:** Provide an understanding of dermatoglyphics and its application in forensic science.
- **CO2:** Examine fingerprint evidence.
- **CO3:** Explain the fundamentals of friction ridges.
- **CO4:** Classify fingerprints for purposes of comparison, identification, and evaluation of impression evidence in crime scenes.
- **CO5:** Interpret and analyze the fundamentals of friction ridges

Unit1: Basics of Dermatoglyphics	14 Hours
Introduction and history: with special reference to India; Biological basis of fingerprints, Structure of skin; Formation of ridges; Fundamental principles of fingerprinting; Plain and rolled fingerprints; Types of fingerprints: latent, patent and plastic; Fingerprint patterns: arches, loops and whorls; Fingerprint characters/minutiae; Poroscopy and edgeoscopy: concept and significance.	
Unit2: Classification of Fingerprints and its significance	14 Hours
Introduction and history of classification systems; Dr. Henry Faulds' syllabic system; Purkinje classification; Galton's tripartite system; Vucetich Argentine system; Henry's classification system; Battley's Single Digit classification system.	
Unit3: Latent Fingerprints: Development, Preservation and Identification	14 Hours
Latent prints: Formation, constituent of sweat residue; Application of light sources in fingerprint detection; Development of latent prints: physical methods (powder and iodine fuming) and chemical methods (ninhydrin, cyanoacrylate, amido black and silver nitrate); Developing fingerprints on gloves; Fingerprinting the deceased; Preservation of developed fingerprints; Digital imaging for fingerprint enhancement; Introduction to Automated Fingerprint Identification System (AFIS).	
Unit4: Additional Impressions	14 Hours
Palm prints: Collection, preservation, ATD angle and its significance; Footprint: Types, location, preservation and significance; Collection of footprints: Casting of footprints, electrostatic lifting of latent footprints; Lip prints: Location, lifting, preservation, examination of lip prints using Suzuki and Tsuchihashi classification system, collection of standards and its significance; Earprints: Deposition and their significance.	

Reference books-

1. Sharma, B. R. (2019). *Forensic Science in Criminal Investigation and Trials*. Central Law Agency.
2. Ashbaugh, D. A. (2000). *Quantitative-Qualitative Friction Ridge Analysis*. Boca Raton: CRC Press.

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3. Champod, C., Lennard, M., Margot, P., & Stoilovic, M. (2004). *Fingerprints and Other Ridge Skin Impressions*. Boca Raton: CRC Press.
4. Champod, C., Lennard, C. J., Margot, P., & Stoilovic, M. (2017). *Fingerprints and Other Ridge Skin Impressions*. CRC Press.
5. Cowger, J. E. (1983). *Friction Ridge Skin*. Boca Raton: CRC Press.
6. Daluz, H. M. (2014). *Fundamentals of Fingerprint Analysis*. CRC Press.
7. Hawthorne, M. R. (2009). *Fingerprints: Analysis and understanding*. CRC Press.
8. Lee, H. C., & Gaensslen, R. E. (2013). *Advances in Fingerprint Technology* (3rd Edition, R. S. Ramotowski, Ed.). Boca Raton: CRC Press.

Course Outcomes (COs):

After successful completion of the course, the student will be able to:

- CO1: To provide an understanding of dermatoglyphics.
- CO2: To enable students to examine and identify fingerprint patterns and fingerprint evidence.
- CO3: To know the collection and preservation of fingerprints on different surfaces.
- CO4: To analyse the characteristics of palm and footprints.
- CO5: To understand Henry's Classification.

Program Name	B.Sc. Forensic Science	Semester	III
Course Title	FORENSIC DERMATOGlyphics LAB		
Course Code	BFS2370	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	4 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Practical Exercises

1. Collection of rolled and plain prints on fingerprint recording slip.
2. Identification and analysis of fingerprint patterns of 20 vivid samples (recorded in blue book).
3. Ridge counting and ridge tracing of fingerprints (20 vivid samples).
4. Classification of fingerprints using Henry's Classification from the fingerprint slip.
5. Development, collection, and preservation of fingerprints on porous surfaces.
6. Development, collection, and preservation of fingerprints on non-porous surfaces.
7. Comparison of disputed print with standard print.
8. Analysing the characteristics of palm prints (5–10 vivid samples).
9. Analysing the characteristics of footprints (5–10 vivid samples).
10. Casting of sunken foot/prints (2–5 vivid samples).
11. Analysis and pattern of lip prints (2–5 vivid samples) (Kajal/lipstick method).

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Program Name	B.Sc. Forensic Science	Semester	III
Course Title	ADVANCED FORENSIC CHEMISTRY		
Course Code	BFS2302	Course Credits	4
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Course Outcomes (COs):

After successful completion of the course, the student will be able to:

- **CO1:** To provide an understanding of the applications of forensic chemistry.
- **CO2:** To learn about the analysis of substances under forensic chemistry.
- **CO3:** Describe the analysis of exhibits encountered in forensic chemistry.
- **CO4:** Analyse arson and petroleum exhibits encountered in explosion cases.
- **CO5:** Evaluate evidence related to alcohol.

Unit1: Basics of Forensic Chemistry	14 hours
Definition and Introduction; Types of cases and exhibits in forensic chemistry; Cement: Types, adulteration and analysis; Trap Cases: Types and chemistry of detective dyes, detection of phenolphthalein, instrumental analysis; Analysis of adulterants in cosmetics, paints, oils, fats, grease, gold, silver, tobacco, tea, sugars, salts; Salient features of Drug and Cosmetics Act, 1940.	
Unit2: Introduction to Arson and Petroleum products	14 hours
Arson: introduction and motives; Fire: chemistry, behaviour, origin and cause; Arson scene investigation, collection and preservation of arson exhibits; Petroleum products: classification, commercial uses and adulteration; Analysis of petrol, kerosene, diesel and lubricants by Bureau Of International Standards (BIS) methods; Analysis and comparison of petroleum products as forensic exhibits: preliminary and confirmatory tests; Salient features of Petroleum Act, 1934.	
Unit3: Basic aspects of Explosives	14 hours
Introduction and classification of explosives; Process of explosion: deflagration and detonation; Improvised Explosive Devices (IEDs) and their characteristics; Collection and preservation of explosive residues from the scene of occurrence; Evaluation and reconstruction of sequence of events.	
Unit4: Alcohol analysis and its legal control	14 hours
Alcoholic beverages: types, country made liquors; Adulteration: types, methanol poisoning; Alcohol impaired driving: breath analyser, blood alcohol concentration, Widmark's equation; Identification and chemical analysis of methanol, ethanol, aldehyde, ester, chloral hydrate and furfural components by colour test ;Instrumental techniques: head space gas chromatography ;Salient features of Excise Act.	

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Reference books:

1. Aggrawal, A. (2017). *Textbook of Forensic Medicine and Toxicology*. APC Publisher.
2. *Laboratory Procedure Manual Forensic Explosives* (2005). Directorate of Forensic Science, Ministry of Home Affairs.
3. DeHaan, J. D. (2013). *Kirk's Fire Investigation* (3rd Edition). New Jersey: Prentice Hall.
4. Saferstein, R. (2015). *Criminalistics* (8th Edition). New Jersey: Prentice Hall.
5. Crippin, J. B. (2017). *Explosives and Chemical Weapons Identification*. Ukraine: Taylor & Francis.
6. Ford, J. (2014). *Explosives & Arson Investigation*. United States: Mason Crest.
7. Newton, D. E. (2007). *Forensic Chemistry*. United States: Facts On File, Incorporated.
8. Meyer, R., Köhler, J., & Homburg, A. (2016). *Explosives*. John Wiley & Sons.
9. Ford, J. (2014). *Explosives & Arson Investigation*. Simon & Schuster.

Program Name	B.Sc., Forensic Science	Semester	III
Course Title	ADVANCED FORENSIC CHEMISTRY LAB		
Course Code	BFS2371	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	4 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Course Outcomes (COs):

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

- CO1: To understand the composition of various samples.
- CO2: To familiarize with various adulterants used in petroleum products.
- CO3: To analyze the various petroleum products.
- CO4: To understand the preparation of TLC plates.
- CO5: To understand explosive substances.

Practical Exercises / Laboratory Tasks:

1. Detection of adulterants present in cement.
2. Detection of adulterants present in dairy products, cooking fats, and honey.
3. Detection of adulterants present in gasoline using filter paper and density test.
4. Analysis of density and flash-point of diesel/kerosene oil.
5. Analysis of arson accelerators.
6. Analysis of explosive substances.
7. Separation of explosive substances using thin-layer chromatography.
8. Qualitative analysis of ethanol and methanol.
9. Articulation of case studies (minimum 20 cases).

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Program Name	B.Sc., Forensic Science	Semester	III
Course Title	TECHNIQUES IN FORENSIC SCIENCE		
Course Code	BFS2303	Course Credits	4
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Course Outcomes (COs):

After successful completion of the course, the student will be able to:

- **CO1:** To explain the instrumentation used in forensic science.
- **CO2:** To provide an understanding of the working principles of forensic instruments.
- **CO3:** Explain the working and applications of microscopy.
- **CO4:** Differentiate between the types of chromatography.
- **CO5:** Appraise the techniques of electrophoresis and summarize the types of spectroscopy used in forensic science.

Unit1: Instrumentation and applications	14 Hours
Principles of optics; Magnifying glass; Working principle, uses and forensic applications of compound microscope, fluorescence microscope, stereo microscope, phase-contrast microscope, comparison microscope, electron microscopes: SEM, TEM, STEM; Sample preparation for electron microscopy.	
Unit2: Chromatography Techniques	14 Hours
Chromatography: Definition, Stahl's triangle, common applications; Working principle, uses and forensic applications of Paper Chromatography, Thin Layer Chromatography (TLC), Column Chromatography, High Performance Liquid Chromatography (HPLC), Gas Chromatography (GC); Sample preparation for chromatography.	
Unit3: Basics of Electrophoresis	14 Hours
Electrophoresis: definition, factors affecting electrophoresis; Working principle, uses and forensic applications of agarose gel electrophoresis, Sodium Dodecyl-Sulfate Polyacrylamide Gel Electrophoresis.	
Unit4: Different Spectroscopic methods	14 Hours
Beer-Lambert Law; Working principle, uses, and forensic applications of Colorimetry, UV-Vis Spectrophotometer; Handheld Spectroscope, IR Spectroscopy, Atomic Absorption Spectroscopy (AAS), Atomic Emission Spectroscopy (AES), Mass Spectrometry (MS), X-Ray Spectrometer (XRS); Working principle, uses, and forensic applications of Enzyme-Linked Immunoassay (ELISA), Radial Immuno Assay (RIA), Neutron Activation Analysis (NAA).	

Ref. Books-

1. C.R. Kothari & Gaurav Garg – *Instrumental Methods of Analysis*
2. Skoog, Holler & Crouch – *Principles of Instrumental Analysis*
3. R.S. Khandpur – *Handbook of Analytical Instruments*
4. E. Heftmann – *Chromatography: Fundamentals and Applications*
5. R.P.W. Scott – *Introduction to Analytical Gas Chromatography*
6. Andreas Chrambach – *The Practice of Quantitative Gel Electrophoresis*
7. Hames & Rickwood – *Gel Electrophoresis of Proteins: A Practical Approach*
8. Pavia, Lampman, Kriz & Vyvyan – *Introduction to Spectroscopy*

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Program Name	B.Sc. Forensic Science	Semester	III
Course Title	TECHNIQUES IN FORENSIC SCIENCE LAB		
Course Code	BFS2372	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	4 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Course Outcomes (COs):

At the end of the course, the student should be able to:

- **CO1:** Analysis of samples using various techniques.
- **CO2:** Application of Physical, Chemical, and Biological techniques.
- **CO3:** To learn the working with Physical, Chemical, and Biological evidences.
- **CO4:** To examine various biological and chemical samples using gel electrophoresis.
- **CO5:** To learn the interpretation of spectrograms and to learn epithelial cells.

Practical Exercises / Laboratory Tasks:

1. Blood group testing: Determination of ABO and Rh tests in blood grouping.
2. Comparison of animal and human hair sample under compound microscopy – mounting and observation.
3. Separation of plant pigments by paper chromatography.
4. Separation of ink using Thin Layer Chromatography.
5. Separation of amino acids using Thin Layer Chromatography.
6. Preparation of agarose gel.
7. Demonstration of Polyacrylamide Gel Electrophoresis.
8. Estimation of concentration of coloured substances using colorimeter.
9. Demonstration of analysis of a drug (Paracetamol) using UV-Vis Spectrophotometer.
10. Demonstration of Enzyme-Linked Immunoassay (ELISA).

References:

1. Prakash Singh Bisen, A. S. (2012). *Introduction to Instrumentation in Life Sciences*. CRC Press.
2. Joseph I. Goldstein, D. E. (2017). *Scanning Electron Microscopy and X-Ray Microanalysis*. Springer.
3. W. Kemp. *Organic Spectroscopy*. CRC Press.
4. R. D. Brown. *Introduction to Instrumental Analysis*. McGraw Hill (1987).
5. T. Braun, G. Ghersene. *Extraction Chromatography*. Elsevier Publications (1978).
6. Shirley Bayne, M. C. (2010). *Forensic Applications of High Performance Liquid Chromatography*. CRC Press.
7. Stuart, S. A. (2013). *Forensic Analytical Techniques*. Wiley-Black.
8. Donald L. Pavia, G. M. (2014). *Introduction to Spectroscopy*. Cengage Learning.
9. H. H. Willard, L. L. Merritt Jr., Dean, Settle. *Instrumental Methods of Analysis*, 7th Edition (2004). CBS Publishers and Distributors.
10. Williams, B. L., & Wilson, K. *A Biologist's Guide to Principles and Techniques of Practical Biochemistry* (1975). CRC Press.

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Program Name	B.Sc. Forensic Science	Semester	III
Course Title	ENGLISH-III		
Course Code	BFS2304	Course Credits	3
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

English-III

Professional Communication in English

Unit 1: Business Communication

- Features of effective communication
- Formal vs. informal communication
- Drafting official letters, memos, and professional emails

Unit 2: Resume & Cover Letter Writing

- Types of resumes: chronological, functional, and combination
- Resume drafting techniques and common errors to avoid
- Writing professional cover letters for job applications

Unit 3: Report & Proposal Writing

- Structure and components of academic and business reports
- Writing project proposals
- Ensuring clarity, precision, and objectivity in writing

Unit 4: Presentation Skills

- Preparing effective PowerPoint presentations (PPTs)
- Public speaking skills and engaging the audience
- Handling Q&A sessions confidently
- Conducting seminar presentations

Unit 5: Public Speaking

- Participating in debates and writing speeches
- Interview techniques and professional etiquette
- Anchoring events and hosting formal programs

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Reference Books

8. Academic Writing: A Handbook for International Students – Stephen Bailey
9. English for Media Studies – Paul MacIntyre & Louise Phillips
10. Creative Writing: A Beginner's Guide – Julia Bell & Paul Magrs
11. Professional Communication – Aruna Koneru
12. English for Competitive Examinations – R. S. Aggarwal
13. Research Writing Skills: A Handbook – James Hartley
14. The Elements of Style – William Strunk Jr. & E. B. White

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Program Name	B.Sc. Forensic Science	Semester	III
Course Title	Basics of Artificial Intelligence in Forensics		
Course Code	BFS2305	Course Credits	2
Contact Hours		Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Artificial Intelligence in Forensics

Course Title: Basics of Artificial Intelligence in Forensic Science

Course Code: [To be assigned]

Credit Hours: 4

Duration: 1 Semester

Course Objective:

To introduce students to the fundamentals of Artificial Intelligence (AI) and its applications in forensic science, including crime analysis, evidence interpretation, and predictive modeling.

Unit 1: Introduction to Artificial Intelligence (8 Hours)

- Definition, history, and scope of AI
- Types of AI: Narrow, General, and Super AI
- Basic concepts: Machine learning, deep learning, and neural networks
- Applications of AI in general science and forensic investigations

Unit 2: Data Handling and Preprocessing (10 Hours)

- Types of data: Structured, unstructured, and semi-structured
- Data collection, cleaning, and preprocessing
- Feature selection and extraction
- Importance of data quality in forensic AI applications

Unit 3: Machine Learning Techniques (12 Hours)

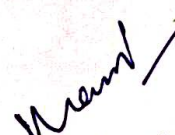
- Supervised learning: Classification and regression
- Unsupervised learning: Clustering and pattern recognition
- Reinforcement learning (basic concept)
- Forensic applications: Fingerprint recognition, facial recognition, and crime pattern analysis

Unit 4: AI Tools and Forensic Applications (10 Hours)

- AI software and platforms used in forensics (e.g., Python libraries, TensorFlow, OpenCV)
- Digital forensics: Image, video, and document analysis

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- Predictive policing and crime scene analysis
- Case studies of AI applications in forensic labs

Unit 5: Ethical, Legal, and Practical Considerations (10 Hours)

- Ethical concerns in AI applications
- Privacy, data security, and bias in AI models
- Legal framework and admissibility of AI-based evidence
- Future trends in AI-assisted forensic investigations

Reference Books

1. **Artificial Intelligence: A Modern Approach** – Stuart Russell & Peter Norvig
2. **Machine Learning for Forensic Science** – D. L. Clarke (or similar applied AI texts)
3. **Python for Data Analysis** – Wes McKinney
4. **Deep Learning** – Ian Goodfellow, Yoshua Bengio, Aaron Courville
5. **Forensic Analytics: Methods and Techniques for Forensic Accounting Investigations** – Mark J. Nigrini
6. **Introduction to Artificial Intelligence** – Wolfgang Ertel
7. **Digital Forensics and AI Applications** – Edited collection of case studies

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BSe. Forensic Science – Questioned Documents

Program Name	B.Sc., Forensic Science	Semester	IV
Course Title	QUESTIONED DOCUMENTS		
Course Code	BFS2401	Course Credits	4
Contact Hours	56	Duration Of SEA/Exam	3hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Course Objective:

To equip students with foundational knowledge and practical skills in the examination of questioned documents, emphasizing scientific analysis techniques to determine authenticity and detect forgeries.

Unit I: Nature and Problems of Documents

- Classification of documents
- Procurement of standard/admitted/specimen writings
- Handling and marking of documents
- Preliminary examination of documents
- Basics of handwriting identification: individuality and natural variations
- Process of comparison
- Types of documents: genuine, forged, and holographic
- Writing features and their estimation
- General and individual characteristics of handwriting
- Basic tools needed for forensic document examination and their use

Unit II: Disguised Writing and Anonymous Letters

- Identification and examination of signatures: genuine vs. forged
- Examination of alterations, erasures, overwriting, additions, and obliterations
- Decipherment of secret, indented, and charred documents
- Examination of seal impressions and other mechanical impressions

Unit III: Examination of Documents

- Detection of forgeries in Xeroxed copies, carbon copies, and fax messages
- Various types of forgeries and their detection
- Examination of built-up documents and determination of sequence of strokes
- Physical matching of documents
- Identification of typewriting and typist
- Identification of printed matter
- Examination of security documents: currency notes, passports, visas, stamp papers, postal stamps

Unit IV: Determination of Age of Documents & Digital Forensics

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- Examination of paper, ink, and signatures for age determination
- Examination of computer printouts: dot-matrix, ink-jet, and laser printers
- Identification of electronic typewriters and credit cards
- Introduction to forensic stylistics and forensic linguistics
- Examination of e-documents and digital signatures
- Introduction to computer forensic opinion writing: principles and reasoning for opinion

Reference Books – Questioned Documents

1. Scientific Examination of Questioned Documents – Werner Moenssens & A. S. H. Heaton
2. Forensic Examination of Questioned Documents – Richard Saferstein
3. Handbook of Forensic Document Examination – F. C. Robinson
4. Forensic Document Examination: Principles and Practice – Katherine M. Koppenhaver
5. Questioned Documents – H. C. Lee & R. Saferstein
6. Forensic Science: Fundamentals & Investigations – Anthony J. Bertino (Chapter on Questioned Documents)

Program Name	B.Sc., Forensic Science	Semester	IV
Course Title	QUESTIONED DOCUMENTS PRACTICAL		
Course Code	BFS2470	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	4 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Practical List – Questioned Documents

1. Handling and preserving questioned documents
2. Examination of documents using magnifying glass and stereomicroscope
3. Inspection under oblique, UV, and IR light
4. Use of Electrostatic Detection Device (EDD) for indented writing
5. Handwriting comparison (slant, size, spacing, pressure)
6. Signature analysis: genuine vs. forged
7. Detection of disguised or simulated handwriting
8. Identification of different types of paper
9. Ink comparison using thin-layer chromatography (TLC)
10. Detection of erasures, overwriting, and alterations
11. Determination of sequence of intersecting lines
12. Case study analysis of real or simulated questioned documents
13. Preparing forensic reports on document examination
14. Group exercises on forgery detection
15. Presentation of findings as an expert witness

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Program Name	B.Sc., Forensic Science	Semester	IV
Course Title	ADVANCED FORENSIC BIOLOGY		
Course Code	BFS2402	Course Credits	4
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Course Outcomes (COs):

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

- **CO1:** To provide an understanding of the nature and importance of biological evidence.
- **CO2:** To enable students to evaluate and analyse biological evidence.
- **CO3:** Describe the forensic significance of blood and body fluids.
- **CO4:** Analyse hair samples encountered in crime investigation and the importance of botanical evidence.

Unit1: Botanical Evidences	14 hours
Leaves, seed, pollen, wood and plant juices as evidence; Transfer of botanical evidence and forensic significance; Collection and preservation of botanical evidence; Diatoms: general morphology; Significance in drowning cases.	
Unit2: Hair as Evidence	14 hours
Morphology; Microscopic morphology; Biochemistry; Growth cycle; Functions and characteristics of hair: scalp, axilla, facial and pubic; Sex differentiation, age estimation and race determination from hair; Disorders of hair; alopecia, hirsutism; Collection and preservation; Forensic examination: scale examination and morphometric analysis; Comparison of human and animal hair.	
Unit3: Blood and Body Fluids as Evidence	14 hours
Blood: composition, functions; Haemopoiesis; Haemoglobin; Forensically relevant enzymes present in blood; Blood smear examination: Leishman stain; Collection and preservation of blood evidence; Presumptive and confirmatory testing of blood evidence; Collection, preservation and examination of body fluids: semen, saliva, urine, faeces, sweat, tear, milk, menstrual blood, fetal blood.	
Unit4: Blood Pattern Analysis	14 hours
Physical, dynamic and biological properties of human blood; Blood stain drying time; Terminologies and classification of blood patterns: impact, cast-off, projected, contact and blood trails; Convergence and point of origin; Documentation of blood patterns; Significance in crime scene reconstruction.	

Program Name	B.Sc. Forensic Science	Semester	IV
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Course Title	ADVANCED FORENSIC BIOLOGY LAB		
Course Code	BFS2471	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	4 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Course Outcomes (COs):

After successful completion of the course, the student will be able to:

- **CO1:** To train students in the analysis of blood and body fluids.
- **CO2:** Enable students to examine biological evidence.
- **CO3:** Analyse blood and body fluids as evidence.
- **CO4:** Infer the significance of hair evidence.
- **CO5:** Assess the evidentiary value of pollen and blood spatter.

Practical Contents:

1. Presumptive testing of dried blood stains.
2. Confirmatory testing of dried blood stains.
3. Leishman staining and microscopic examination of blood smear.
4. Examination and analysis of saliva (Qualitative test).
5. Examination of seminal stains.
6. Microscopic examination of hair – Transverse and cross sections.
7. Microscopic examination of hair – Scale examination.
8. Examination of pollen.
9. Documentation of blood splatter.
10. Interpretation of blood patterns.

References:

1. Abul K. Abbas, Andrew H. H. Lichtman, Shiv Pillai (2017). *Cellular and Molecular Immunology*. Elsevier.
2. Alan Gunn (2009). *Essential Forensic Biology*. Wiley.
3. J. Thomas McClintock (2014). *Forensic Analysis of Biological Evidence: A Laboratory Guide for Serological and DNA Typing*. CRC Press.
4. Li, Richard (2015). *Forensic Biology*. CRC Press.
5. Kintz, Pascal, Salomone, Alberto, Vincenti, Marco (2015). *Hair Analysis in Clinical and Forensic Toxicology*. Academic Press.
6. Bruce Budowle, Steven Schutzer, Stephen Morse (eds.) (2020). *Microbial Forensics*. Academic Press.
7. Jane E. Huffman, John R. Wallace (2011). *Wildlife Forensics: Methods and Applications*. Wiley.

Program Name	B.Sc. Forensic Science	Semester	IV
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Course Title	Forensic psychology		
Course Code	BFS2403	Course Credits	4
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Course Code:	DISCIPLINE MAJOR COURSE FORENSIC SCIENCE SEMESTER- II FORENSIC PSYCHOLOGY	
COURSE OBJECTIVES:	Introduce the concepts of psychology – definition, goals, history, and development of psychology. It aims at explaining the concept of forensic entomology and forensic psychology with details involved and their application in forensic investigations.	
Unit-1:	The Science of Psychology Concepts of psychology - Definition of psychology, goals of psychology, History of psychology - Development of psychology, role of psychologist, Different perspectives in Psychology - Modern perspectives, Humanistic, behavioristic, cognitive, psychodynamic, Types of psychology professions - Psychiatrist, Psychologist, Counselor, The science and research methods - Interview, observation, case study method.	
Unit-2:	Biological Perspective Nerve and neuron - Building the network, structure of neuron, neural impulses, neurotransmitters, Nervous System - Central nervous system, structure and function of CNS, types of amnesia, Peripheral nervous system, Human brain - structure and function, significance of left and right brain, types of amnesia, Endocrine system - Pituitary gland, Thyroid gland, Neurotransmitters. Consciousness & Perception Consciousness - Definition of consciousness, states of consciousness, Altered state of consciousness - Dreams, awake states including day dreaming, Rhythms of consciousness (Circadian rhythms), Sleep – stages of sleep, Dreams – Content, REM sleep and non-REM sleep, Altered states – Hypnosis, Meaning, Hypnotic stages, Attention and awareness definition, Sensation and perception - Basic concepts in perception, problems in attention and perception, assessment of attention and perception.	
Unit-3:	Learning and Memory Learning: Definition, and types of learning, Classical conditioning – Conditioned stimulus, unconditioned stimulus, Operant Conditioning – Thorndike’s law of effect, basics of operant conditioning, generalization, discrimination. Reinforcement – Primary and Secondary, Positive Reinforcers, Punishment, Cognitive Learning – Latent learning; observational learning. Basic Processes of Memory – Encoding, Storage, Retrieval. Sensory – Iconic Memory and Echoic Memory; STM – Working Memory, LTM,	

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	Episodic Memory. Explicit memory and Implicit memory, Techniques to improve memory: Rehearsal, Chunking, Mnemonics, Forgetting.	
Unit-4:	Cognition, Motivation and Emotion Thinking – Theories and models of thinking, types of thinking, Decision making and problem solving – Stages of problem solving, methods of problem solving, theories of decision making. Concept formation – Types of concepts. Intelligence – Definition, tests of intelligence, concept of IQ. Motivation – Types and approaches of motivation and emotion. Stress and coping – Endocrine system, types of stresses, relaxation techniques.	
Unit-5:	Theories of Personality Understanding personality – Definition, stressing uniqueness, enduring characteristics, temperament. Approaches – Psychodynamic (Freud, Jung & Adler), Humanistic (Rogers & Maslow). Assessment of personality – Questionnaires, Rating Scales and Projective tests, biological model assessment of personality.	
Textbook:	B.B. Nanda and R.K. Tiwari, <i>Forensic Science in India: A Vision for the Twenty First Century</i> , Select Publishers, New Delhi (2001).	
Reference Books:	M.K. Bhasin and S. Nath, <i>Role of Forensic Science in the New Millennium</i> , University of Delhi, Delhi (2002), S.H. James and J.J. Nordby, <i>Forensic Science: An Introduction to Scientific and Investigative Techniques</i> , 2nd Edition, CRC Press, Boca Raton (2005).	

Course Title	Forensic psychology Lab
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Course Code	BFS2472	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	4 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

**DISCIPLINE MAJOR COURSE FORENSIC SCIENCE
SEMESTER-II
FORENSIC PSYCHOLOGY (LAB)**

COURSE OBJECTIVES:

The objective of this course is to:

1. To learn different types of injuries and their forensic investigations.
2. To understand the concept of Forensic Entomology, their history and significance.
3. To analyse different methods used in forensic psychology like lie detection, brain fingerprinting, narco-analysis, hypnosis, neuro-anthropological and psychological testing.

List of 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 Thematic Appreciation Test.
9. To prepare a case report on Word Association Test.
10. To prepare a case report on Bhatia's Battery of Performance Test of Intelligence.
11. To cite a criminal case in which narco-analysis was used as a means to detect deception.

Books Suggested:

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),
R. Saferstein, *Criminalistics*, 8th Edition, Prentice Hall, New Jersey (2004),
J.C. DeLadurantey and D.R. Sullivan, *Criminal Investigation Standards*, Harper & Row, New York (1980)
J. Niehaus, *Investigative Forensic Hypnosis*, CRC Press, Boca Raton (1999),
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 Title	English-IV
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Course Code	BFS2404	Course Credits	3
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

English-IV

English for Research, Media & Advanced Communication

Unit 1: Research Writing

- Structure of research papers
- Citation styles: APA, MLA, Chicago
- Awareness of plagiarism and ethical writing practices
- Writing reviews: books, articles, and scholarly content

Unit 2: Media English

- Writing news reports and press releases
- Drafting film and book reviews
- Writing for blogs and social media platforms
- Developing clarity and conciseness in media writing

Unit 3: Creative Writing

- Writing short stories
- Composing reflective essays
- Poetry composition and literary expression
- Dialogue and script writing for plays, films, or media

Unit 4: Advanced Professional Skills

- Understanding workplace ethics and professional conduct
- Cross-cultural communication skills
- Negotiation strategies and persuasive language
- Leadership communication and team management language

Unit 5: English for Competitive Exams

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- Reading comprehension techniques
- Vocabulary building exercises
- Precis writing for exams
- Essay writing strategies for competitive examinations

Reference Books

15. **Academic Writing: A Handbook for International Students** – Stephen Bailey
16. **English for Media Studies** – Paul MacIntyre & Louise Phillips
17. **Creative Writing: A Beginner's Guide** – Julia Bell & Paul Magrs
18. **Professional Communication** – Aruna Koneru
19. **English for Competitive Examinations** – R. S. Aggarwal
20. **Research Writing Skills: A Handbook** – James Hartley
21. **The Elements of Style** – William Strunk Jr. & E. B. White

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Course Title	Constitution of India		
Course Code	BFS2405	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Constitution of India

Course Objectives:

- Understand the historical evolution and philosophy of the Indian Constitution
- Interpret key structural features, organs, and institutions
- Analyze fundamental rights, duties, and directive principles in the Indian context
- Examine constitutional amendments, federalism, and center–state relations
- Appreciate the role of constitutional bodies and contemporary challenges

Unit I: Foundations and Philosophy of the Constitution (12 Hours)

- Need and purpose of a Constitution
- Historical background: Colonial Acts and freedom struggle
- Constituent Assembly: composition, debates, committees
- Preamble and salient features
- Basic Structure Doctrine and Constitutional Morality

Unit II: Fundamental Rights, Duties & Directive Principles (12 Hours)

- Fundamental Rights: nature, classification, and enforcement (Article 32)
- Fundamental Duties
- Directive Principles of State Policy (DPSP)
- Interrelationship of Rights, Duties, and DPSPs
- Landmark judgments related to Fundamental Rights & DPSPs

Unit III: Structure, Organs and Federal Design (12 Hours)

- Union, States, and Territories
- Legislature: Parliament & State Legislatures
- Executive: President, Prime Minister, Governors, Council of Ministers
- Judiciary: Supreme Court, High Courts, Judicial Review
- Federalism: Centre–State relations, cooperative federalism, 7th Schedule

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- Amendment Procedure & Basic Structure Doctrine

Unit IV: Constitutional Bodies & Emergency Provisions (10 Hours)

- Election Commission of India
- Comptroller & Auditor General (CAG)
- Union & State Public Service Commissions
- National Commissions: SC, ST, Women, Minorities, etc.
- Emergency Provisions: National, State, and Financial Emergencies

Unit V: Contemporary Issues & Constitutional Relevance (10 Hours)

- Judicial Activism and Public Interest Litigation (PIL)
- Secularism, Social Justice, and Reservation Policies
- Gender Justice, Environmental Rights, and Digital Rights
- Recent Constitutional Amendments
- Contemporary Challenges and Constitutional Morality

Reference Books

1. **Introduction to the Constitution of India** – D. D. Basu
2. **Our Constitution** – Subhash Kashyap
3. **Indian Polity** – M. Laxmikanth
4. **Constitution of India** – P. M. Bakshi
5. **Commentary on the Constitution of India** – Durga Das Basu
6. **Working of the Indian Constitution** – Granville Austin

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Program Name	B.Sc., Forensic Science	Semester	V
Course Title	FORENSIC TOXICOLOGY		
Course Code	BFS3501	Course Credits	3
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Course Outcomes (COs):

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

- **CO1:** To familiarize the student with the most frequently encountered substances in forensic toxicology and drug-related casework.
- **CO2:** To develop an understanding of the uses, effects, pharmacology, and toxicology of drugs.
- **CO3:** Acquire knowledge on forensic identification of illicit liquors.
- **CO4:** To understand the classification and characteristics of narcotics, drugs, and psychotropic substances.
- **CO5:** To understand and analyse poisons.

Unit1: Introduction to Toxicology	14 hours
Introduction, scope and branches of toxicology; Exposure: routes of administration: enteral and parenteral; Types of toxicity; Lethal dose-50 and Effective dose-50; Dose-response relationships; Synergism; Introduction to pharmacokinetics; Absorption: Fluid mosaic model, passive diffusion, active transport, factors affecting absorption; Distribution: volume of distribution, factors affecting distribution, bioavailability of drugs; Metabolism and excretion of poisons	
Unit 2: Poisons	14 hours
Types of poisoning: accidental, suicidal and homicidal; Classification based on: physico-chemical properties, mode of action; Corrosives: acids and alkalis; Irritants: Inorganic, organic: plant, animal and mechanical; Systemics: neurotics, cardiac, asphyxiants; Miscellaneous poisons; Sample collection and preservation of toxicological exhibits (viscera, blood, urine) in fatal and survival cases of poisoning; Antidotes: classification, mechanism of action; Medico legal aspects	
Unit3: Analysis of Poisons	14 hours
Extraction: distillation, acid digestion, wet digestion, micro-extraction, ammonium sulphate method, Stas-Otto method; Analysis and estimation of poisons: spot tests, chromatographic, electrophoretic techniques, spectrophotometric and instrumental methods; Interpretation of toxicological findings; Field testing in toxicological work; Relevant sections of Indian Penal Code.	
Unit4: Narcotic and Psychoactive	14 hours
Drugs: Introduction to narcotic substances and psychoactive drugs: definition, drug use, drug misuse, drug abuse, dependence and withdrawals, addiction and tolerance; Classification of drugs; Designer drugs and date drugs; Differentiation between natural and synthetic drugs; Relevant sections of Narcotics and Psychotropic Substances (NDPS) Act.	

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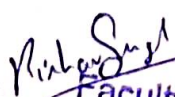
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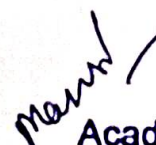
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Reference books:

1. Parikh, C.K. (2007). *Parikh's Textbook of Medical Jurisprudence & Toxicology: For Classrooms & Courtrooms*.
2. Modi, J.P. (2013). *Text-Book of Medical Jurisprudence and Toxicology: Medical Jurisprudence and Toxicology for India*. Butterworth-Heinemann.
3. Reddy, K.S.N., & Murty, O.P. (2014). *The Essentials of Forensic Medicine and Toxicology*. Macmillan Publishers.
4. Tripathi, K. (2019). *Pharmacological Classification of Drugs with Doses and Preparations*. Macmillan Publishers.
5. Biswas, G., Prahlow, J.A., & Aggrawal, A. (2022). *Review of Forensic Medicine and Toxicology: Including Clinical and Pathological Aspects (2nd ed.)*. Jaypee Brothers Medical Pub.



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Program Name	B.Sc., Forensic Science	Semester	V
Course Title	FORENSIC TOXICOLOGY LAB		
Course Code	BFS3570	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	4 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Course Outcomes (COs):

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

- CO1: Develop an understanding of the uses, effects, pharmacology, and toxicology of drugs.
- CO2: Acquire knowledge on forensic identification of illicit liquors.
- CO3: Understand the classification of drugs and psychotropic substances.
- CO4: Understand the characteristics of narcotics, drugs, and psychotropic substances.
- CO5: Understanding qualitative analysis of drug abuse.

Practical Contents:

1. Qualitative analysis of metallic poisons.
2. Extraction and qualitative analysis of common plant poisons.
3. Qualitative analysis of ethanol from biological sample.
4. Quantitative estimation of ethyl alcohol in blood samples.
5. Qualitative analysis of organo-chlorides and organo-phosphates pesticides using spot and color tests.
6. Extraction and identification of pesticides using thin-layer chromatography from a simulated case with report writing.
7. Quantitative analysis of over-the-counter drugs using UV-Vis Spectrophotometry.
8. Qualitative analysis of barbiturates.
9. Separation of carbolic acid, phenol, and glycol drugs by Thin Layer Chromatography.
10. Qualitative analysis of drug abuse.
11. Visit to Cyber Economic Narcotics (CEN) Police station (Optional).

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Program Name	B.Sc., Forensic Science	Semester	V
Course Title	FORENSIC COMPUTING & CYBER CRIME		
Course Code	BFS3502	Course Credits	3
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Course Outcomes (COs):

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

- **CO1:** Learn the processes of computer forensics, including topics within digital forensics and computer crimes.
- **CO2:** Acquire knowledge of how digital evidence plays a role in criminal and civil investigations and incident response.
- **CO3:** Identify, gather evidence, and preserve proof of a law-breaking activity.
- **CO4:** Understand different Cyber Laws.
- **CO5:** Understand Cyber and Computer Crimes.

Unit1: Basics of Computers	14 hours
Components of computer: input and output devices, central processing unit, memory hierarchy, types of memory, storage devices, system software, application software, types of operating system; Number systems: binary, hexadecimal; Introduction to computer languages.	
Unit2: Storage and Networking	14 hours
Historical development of hard disk: Hard disk drive and Solid-state drive; Physical construction, Cylinder Head Sector and Logical Block Addressing; Encoding methods and formats; Methods of storing data. Introduction to network: Local area network, wide area network and metropolitan area network; Network devices; Overview of Open System Interconnection (OSI) and Transmission Control Protocol/Internet Protocol models (TCP/IP); Introduction to cloud computing;	
Unit3: Cyber and Computer Crimes	14 hours
Definition and types of cyber-crimes: Internal and External Attacks; Introduction to internet crimes: hacking and cracking, computer stalking, credit card and ATM frauds, phishing, identity theft, data theft, steganography; Crimes related to social media: cyber bullying, cyber stalking, cyber defamation; Types of computer crimes: cyber pornography, computer terrorism, hate speech, Malicious codes; Crimes related to intellectual property rights; software piracy; Emerging digital crimes.	
Unit4: Cyber Law	14 hours
Measures to prevent cyber-crime; Information Technology Act, 2000 (43A, 65, 66, 66A to 66F, 67, 67A, 67B, 70, 70A, 70B); Controller, Certifying Authority and Cyber Appellate Tribunal; Amendments to Indian Penal Code; Section 45A of Indian Evidence Act; National Cyber Security Policy 2013, Information Technology Rules, Data Privacy and Protection Act 2023; Roles of nodal agencies: State Cyber Cell, Cyber Security Division (MeitY), Indian Computer Emergency Response Team; National Institute of Standards and Technology.	

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Reference Books:

1. Joshi, R. (2006). Introduction to computers. Gyan Publishing House.
2. Venkatachalam, S. (1996). Introduction to computers. Pitambar Publishing House.
3. P.K. Singh. (2015). Basics of Computer. V.K. Publications.
4. Miller, M. (2016). Computer basics: (10th ed.). Que.
5. Joshi, R.C. (2005). Operating systems: A simplified methodological approach. Dreamtech Press.
6. Odom, W. (2004). Computer Networking first-step. Macmillan Computer Pub.
7. Bagad, V.S., & Dhotre, I.A. (2010). Data Communication and Networking. Technical Publications.
8. Beasley, J.S., & Nilkaew, P. (2012). Networking essentials. Pearson Education.
9. Gerdes, L. I. (2009). Cybercrime. Greenhaven Press.
10. Moore, R. (2015). Cybercrime: Investigating high-technology computer crime. Routledge Taylor & Francis Group.
11. J., M.J.A., & Menendez, D. (2008). Cyber forensics: A Field Manual for collecting, examining, and preserving evidence of computer crimes. Auerbach Publications.
12. Casey, E. (2004). Digital Evidence and Computer Crime: Forensic Science, Computers and the Internet. Academic.

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Program Name	B.Sc., Forensic Science	Semester	V
Course Title	FORENSIC COMPUTING & CYBER CRIME LAB		
Course Code	BFS3571	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	4 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Course Outcomes (COs):

At the end of the course the student should be able to:

- CO1. To learn about various types of computer systems used in the cybercrime.
- CO2. To know about computer forensic tools.
- CO3. Learn the demonstration of booting procedure (using Windows/Linux), examination of parts of hard disk drive.
- CO4. Learn the demonstration of email phishing attack and its preventive measures.
- CO5. Understand the Crime, Economic aspects, and regulations.

Sl. No. Practical Contents

1. Safety practices in cyberspace.
2. Identification of the internal and external components of a computer system.
3. Demonstration of booting procedure (using Windows/Linux).
4. Examination of parts of hard disk drive.
5. Detection of steganography.
6. Setting up of a local area network.
7. Analysis of network packets using Wireshark.
8. Demonstration of email phishing attack and its preventive measures.
9. Preparing checklist for reporting cyber-crime online.
10. Analysis of a case study pertaining to Section 66 of Information Technology Act 2000.
11. Visit to Cyber Crime and Economic and regulation Centers – Report preparation.

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Program Name	B.Sc., Forensic Science	Semester	V
Course Title	FORENSIC PHYSICS		
Course Code	BFS3503	Course Credits	3
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Forensic Physics

Unit I: Glass

- Types of glass and their composition
- Forensic examination of glass fractures under different conditions
- Determination of direction of impact: cone fracture, rib marks, hackle marks, backward fragmentation
- Analysis of color and fluorescence
- Physical matching of glass fragments
- Density comparison and physical measurements
- Determination of refractive index using a refractometer
- Elemental analysis of glass
- Interpretation of glass evidence in forensic investigations

Unit II: Soil

- Formation and types of soil
- Composition and color of soil
- Particle size distribution
- Turbidity test and microscopic examination
- Density gradient analysis
- Ignition test and differential thermal analysis
- Elemental analysis of soil samples
- Interpretation of soil evidence
- Discussion of important case studies involving glass and soil

Unit III: Paint

- Types of paint and their composition
- Macroscopic and microscopic studies of paint layers
- Pigment distribution analysis
- Micro-chemical analysis and solubility tests

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- Pyrolysis chromatographic techniques and Thin Layer Chromatography (TLC)
- Colorimetry, Infrared (IR) spectroscopy, and X-ray diffraction for paint analysis
- Elemental analysis
- Interpretation of paint evidence

Unit IV: Building Materials

- Types of cement and their composition
- Determination of adulterants by physical, chemical, and instrumental methods
- Examination and analysis of bricks, bitumen, and road materials
- Analysis of cement mortar, cement concrete, and stones
- Forensic examination of electrical appliances and installations

Unit V: Tool Marks

- Types of tool marks: compression marks, striated marks, combination marks, repeated marks
- Class characteristics and individual characteristics of tools
- Tracing and lifting of marks from surfaces
- Photographic examination of tool marks and cut marks on clothes and walls
- Restoration of erased or obliterated marks:
 - Methods of making casts, punches, and engraving
 - Methods of obliteration and restoration (etching for different metals, magnetic, electrolytic)
 - Recording and restoration of marks on wood, leather, polymer, etc.

Reference Books

1. **Forensic Science: Fundamentals & Investigations** – Anthony J. Bertino
2. **Criminalistics: An Introduction to Forensic Science** – Richard Saferstein
3. **Forensic Examination of Glass, Paint and Soil** – James Robertson & David Watson
4. **Techniques of Crime Scene Investigation** – Barry A. J. Fisher
5. **Forensic Science in Crime Investigation** – B. R. Sharma
6. **Forensic Materials Science: Handbook** – F. P. Beer & J. DeWolf (Chapters on materials)
7. **Practical Forensic Science** – Dr. R. K. Sharma

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Program Name	B.Sc., Forensic Science	Semester	V
Course Title	FORENSIC PHYSICS LAB		
Course Code	BFS3572	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	4 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Forensic Physics Practical List

1. Physical matching of glass fragments
2. Determination of direction of impact on glass (cone fracture, rib marks)
3. Density comparison of glass samples
4. Refractive index determination of glass using a refractometer
5. Microscopic examination of soil particles
6. Particle size distribution analysis of soil
7. Turbidity test of soil samples
8. Macroscopic and microscopic study of paint layers
9. Thin Layer Chromatography (TLC) of paint samples
10. Colorimetry analysis of paint
11. Analysis of cement composition and detection of adulterants
12. Examination of bricks and stones
13. Identification of compression and striated tool marks
14. Tracing and lifting of tool marks from surfaces
15. Restoration of obliterated marks on metals or wood (using simple casting/etching methods)

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Program Name	B.Sc., Forensic Science	Semester	V
Course Title	ARSON AND EXPLOSIVE		
Course Code	BFS3504	Course Credits	3
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Arson and explosives

Course Objective:

- Provide fundamental knowledge of fire and explosion science relevant to forensic investigation.
- Train students in scene assessment, evidence collection, laboratory analysis and interpretation of arson and explosive incidents.
- Impart safety, legal and reporting skills required for expert testimony.

Unit I — Fundamentals of Fire Science (8 Hours)

- Nature of fire: fire triangle and tetrahedron (fuel, oxidant, heat, chemical chain reaction)
- Stages of fire: ignition, growth, fully developed, decay
- Combustion chemistry: oxidation, pyrolysis, flame properties, heat release rate
- Heat transfer: conduction, convection, radiation
- Fire behavior factors: ventilation, fuel load, materials

Unit II — Fire Dynamics, Patterns & Scene Examination (12 Hours)

- Fire patterns and origin determination (burn patterns, V-patterns, flow, spalling)
- Fire spread mechanisms in buildings and outdoors
- Scene safety, cordon, scene preservation and documentation (photography, sketching)
- Systematic approach to locating point of origin and ignition sources
- Differentiating accidental vs. deliberate (indicators of arson)

Unit III — Ignitable Liquids & Laboratory Analysis (10 Hours)

- Types and properties of ignitable liquids (petroleum distillates, solvents, accelerants)
- Sampling and evidence packaging for ignitable liquids and debris

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- Screening techniques: sniffers, canine detection, portable instruments
- Laboratory methods: Headspace analysis, GC-MS, Passive headspace concentrators, GC-FID, and data interpretation
- Interpretation of ignitable liquid patterns and reporting

Unit IV — Explosives: Types, Mechanisms & Identification (10 Hours)

- Classification: low-order vs high-order explosives; primary, secondary, tertiary explosives; blasting agents; ANFO; military explosives; IED basics
- Chemistry of detonation vs deflagration; detonation velocity, brisance
- Components of explosive devices (initiators, boosters, main charge, casing, shrapnel, initiators/detonators)
- Post-blast scene examination: search strategies, safety, evidence collection (fragments, residues, wiring, detonators)
- Laboratory analysis: extraction of residues, SEM-EDX, GC-MS, Ion Chromatography, color tests and interpretation

Unit V — Blast Effects, Legal Issues & Reporting (10 Hours)

- Blast physics and effects on structures, vehicles and human body (primary, secondary, tertiary blast injuries)
- Reconstruction of blast events and sequence analysis
- Chain of custody, admissibility of arson/explosive evidence, expert testimony and courtroom presentation
- Safety, decontamination, interagency coordination and incident response (police, bomb squad, fire services)
- Contemporary issues: terrorism-related explosions, environmental impact, preventive measures

Short Reference Book List

1. **Fire Investigation** – Delbert S. Elliott & Dr. Alan M. Shipley (or standard fire investigation texts)
2. **Kirk's Fire Investigation** – John D. DeHaan (or equivalent authoritative text)
3. **Forensic Investigation of Explosions** – Fulton & Bevan (or similar explosives forensic texts)
4. **Hazardous Materials: Managing the Incident** – A. J. (for safety & scene management)
5. **Forensic Science: An Introduction to Scientific and Investigative Techniques** – Stuart H. James & Jon J. Nordby (chapters on fire & explosives)

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Program Name	B.Sc., Forensic Science	Semester	V
Course Title	Speaker Identification and Tape Authentication		
Course Code	BFS3505	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Speaker Identification and Tape Authentication

Unit I: Introduction to Human Voice Anatomy

- Introduction, definition, scope, and significance of forensic phonetics
- Human vocal tract and basic anatomy
- Human vocal apparatus: vocal cords, supra-laryngeal vocal tract
- Oral cavity, pharyngeal cavity, nasal cavity
- Alveolar ridge, epiglottis, glottis
- Soft and hard palate, pharynx, larynx
- Trachea, bronchi, lungs

Unit II: Anatomy and Theory of Voice Production

- Anatomy of human voice production
- Voice production theories and their types
- Vocal fold and airflow oscillation analysis
- Mechanism of vocal fold tissue during speech production
- Speech signals: acquisition, processing, and pattern recognition
- Acoustic characteristics of speech: tone, voicing, pitch, intensity
- Basic factors influencing sound in speech

Unit III: Forensic Phonetic Parameters

- Acoustic and auditory parameters
- Traditional vs. automatic parameters
- Linguistic and individual variation parameters
- Quantitative and qualitative parameters
- Discrete and continuous parameters

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Unit IV: Signal Processing in Speech Analysis

- Fourier analysis of sound waves
- Frequency and time domain representation of speech signals
- Analog-to-digital conversion and signal digitization
- Fast Fourier Transform (FFT)
- Quantization, digitization, and speech enhancement
- Analysis of audio and video signals for authenticity

Unit V: Speaker Recognition and Pattern Analysis

- Introduction to pattern recognition and comparison techniques
- Speaker recognition procedures
- Methods of voice identification: listener-based and instrumental/sound spectrographic
- Classical and computerized approaches
- Analysis of sound spectrograms and sound spectrographs: principles and working
- Forensic applications of voice and speech analysis

Reference Books

1. **Forensic Speaker Recognition** – Douglas A. Reynolds & John P. Campbell
2. **Principles of Forensic Voice Identification** – Thomas C. Neustein
3. **Forensic Phonetics: Fundamentals and Practice** – Rose & Smith
4. **Fundamentals of Speech Recognition** – Lawrence Rabiner & Biing-Hwang Juang
5. **Acoustic and Auditory Phonetics** – Keith Johnson
6. **Forensic Voice Comparison** – Peter French & Tom Owen
7. **Digital Signal Processing in Forensic Audio Analysis** – C. H. Hansen & S. Mehta

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Program Name	B.Sc., Forensic Science	Semester	VI
Course Title	Forensic Serology		
Course Code	BFS3601	Course Credits	3
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Forensic serology

Course Objective:

- To provide students with knowledge of human body fluids and their forensic significance.
- To train students in the detection, identification, and analysis of biological evidence.
- To understand serological tests and their applications in criminal investigations.

Unit I: Introduction to Forensic Serology (8 Hours)

- Definition, scope, and significance of forensic serology
- Human body fluids: blood, semen, saliva, sweat, urine, vaginal secretions
- Composition, function, and forensic importance of each body fluid
- Basic concepts in immunology and antigen-antibody reactions

Unit II: Blood and Its Forensic Examination (12 Hours)

- Collection, preservation, and storage of blood samples
- Physical characteristics of blood: color, viscosity, clotting
- Detection of blood at crime scenes: presumptive and confirmatory tests (Luminol, Kastle-Meyer, Benzidine, etc.)
- Blood group systems: ABO, Rh, MN, and other minor blood groups
- Blood typing and identification of individual characteristics
- Detection of mixed or degraded blood samples

Unit III: Semen and Sexual Assault Evidence (10 Hours)

- Composition and forensic significance of semen
- Collection and preservation of semen samples
- Detection techniques: acid phosphatase test, P30 (prostate-specific antigen) test
- Microscopic examination of spermatozoa
- Identification of semen in sexual assault cases
- Forensic examination of vaginal swabs and sexual assault kits

Unit IV: Saliva, Urine, Sweat, and Other Body Fluids (10 Hours)

- Saliva: detection methods (starch-iodine test, amylase test) and forensic importance
- Urine and sweat: composition and forensic relevance
- Other body fluids: vaginal secretions, tears, gastric contents
- DNA extraction from body fluids for forensic analysis
- Handling and preservation of biological evidence

Unit V: Serological Techniques and Case Applications (10 Hours)

- Immunological techniques: ELISA, precipitation, agglutination tests
- Forensic DNA typing and its relation to serology
- Interpretation of serological evidence
- Forensic applications in criminal, paternity, and sexual assault cases
- Documentation, reporting, and legal aspects of serological evidence

Reference Books – Forensic Serology

1. **Forensic Science: Fundamentals & Investigations** – Anthony J. Bertino
2. **Criminalistics: An Introduction to Forensic Science** – Richard Saferstein
3. **Forensic Serology and Bloodstain Pattern Analysis** – Max M. Houck & Jay A. Siegel
4. **Principles of Forensic Medicine and Toxicology** – Apurba Nandy
5. **Textbook of Forensic Medicine & Toxicology** – Reddy K. S. N.
6. **Forensic Biology** – Richard Li
7. **Introduction to Forensic and Criminalistics Science** – Bernard Knight

Program Name	B.Sc., Forensic Science	Semester	VI
Course Title	Forensic Serology Lab		
Course Code	BFS3670	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Forensic serology lab

1. Blood group determination (ABO and Rh system)
2. Presumptive tests for blood detection (Kastle-Meyer, Luminol)
3. Detection of mixed blood samples
4. Microscopic examination of semen and spermatozoa
5. Detection of acid phosphatase activity in semen
6. Saliva identification using amylase test
7. Urine and sweat analysis for forensic relevance
8. Extraction of DNA from body fluids (demonstration or simulation)
9. Application of agglutination or ELISA tests for forensic purposes
10. Preparation of a serological report and documentation

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Program Name	B.Sc., Forensic Science	Semester	VI
Course Title	Digital Forensics		
Course Code	BFS3602	Course Credits	3
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Digital forensics

Course Objective:

- Introduce students to principles, tools, and techniques of digital forensics.
- Train students in the identification, preservation, analysis, and presentation of digital evidence.
- Familiarize students with cybercrime investigation, laws, and ethical issues.

Unit I: Introduction to Digital Forensics (8 Hours)

- Definition, scope, and significance of digital forensics
- Cybercrime and its types: hacking, phishing, identity theft, cyberstalking, ransomware
- Digital evidence: types, characteristics, and sources
- Legal aspects: laws related to cybercrime in India and internationally
- Role of digital forensic expert

Unit II: Computer Forensics (10 Hours)

- Fundamentals of computer systems: hardware, software, and storage devices
- Operating systems: Windows, Linux, macOS overview for forensic purposes
- File systems: FAT, NTFS, ext, and HFS+
- Evidence acquisition: live vs. static acquisition
- Chain of custody and documentation
- Forensic imaging and cloning of storage media

Unit III: Mobile & Network Forensics (10 Hours)

- Mobile devices: smartphones, tablets, SIM cards, memory cards
- Mobile forensic tools and techniques: data extraction, backup analysis
- Network forensics: capture, storage, and analysis of network traffic
- Logs and metadata analysis

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- Wireless network and cloud forensics basics

Unit IV: Forensic Tools & Techniques (12 Hours)

- Digital forensic software: EnCase, FTK, Autopsy, X-Ways
- Data recovery: deleted, hidden, and encrypted files
- Password cracking and data decryption techniques
- Malware analysis and detection
- Email and social media forensic analysis

Unit V: Forensic Reporting & Case Studies (10 Hours)

- Analysis, interpretation, and correlation of digital evidence
- Writing forensic reports: clarity, accuracy, and admissibility
- Presentation of digital evidence in court
- Case studies of cybercrime investigations
- Emerging trends in digital forensics: IoT, blockchain, cloud computing

Reference Books

1. **Guide to Computer Forensics and Investigations** – Bill Nelson, Amelia Phillips, Christopher Steuart
2. **Digital Forensics for Legal Professionals** – Larry Daniel & Lars Daniel
3. **Cyber Forensics: A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes** – Albert J. Marcella Jr. & Frederic I. Marcella
4. **Computer Forensics: Principles and Practices** – Linda Volonino & Reynaldo Anzaldua
5. **Digital Evidence and Computer Crime** – Eoghan Casey
6. **Handbook of Digital Forensics and Investigation** – Eoghan Casey


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Program Name	B.Sc., Forensic Science	Semester	VI
Course Title	Digital Forensics Lab		
Course Code	BFS36071	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	4 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Digital forensics Lab

1. Creating forensic images of hard drives or storage devices
2. Recovery of deleted files from computers
3. Analysis of file metadata and timestamps
4. Examination of USB drives and memory cards for evidence
5. Forensic analysis of mobile phone data
6. Analysis of email headers and web browser history
7. Password-protected file analysis (using safe methods)
8. Network traffic capture and analysis
9. Using forensic software tools (Autopsy, FTK, EnCase)
10. Preparing a digital forensic report

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Program Name	B.Sc., Forensic Science	Semester	VI
Course Title	Forensic Ballistics		
Course Code	BFS3603	Course Credits	3
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Forensic ballistics

Course Objective:

Provide students with systematic knowledge of firearms, ammunition, ballistic science, identification techniques, and forensic investigation of firearm-related incidents.

UNIT I — History, Classification & Firearm Components

- **History & background** of firearms: evolution and significance in forensics
- **Classification** of firearms (by action, caliber, purpose, construction) and their characteristics
- **Components of small arms:** barrel, breech, lock/receiver, stock, sights, trigger group, etc.
- **Smoothbore vs. rifled barrels** — differences and forensic implications
- **Rifling:** purpose, types (e.g., land-and-groove, polygonal), and methods of producing rifling
- **Trigger & firing mechanisms:** types and working principles
- **Cartridge-firing mechanism** and basic internal operation during discharge
- **Projectile velocity determination** (basic concepts)
- **Theory of recoil** and methods for measurement of recoil
- **Techniques for dismantling and assembling firearms** (safe handling procedures)
- **Identification of origin:** manufactured, improvised / country-made / imitative firearms — constructional features and recognition

UNIT II — Ammunition: Types, Components & Safety

- **Introduction & classification** of ammunition (cartridges, shotshells, caseless, etc.)
- **Constructional features** of cartridges: case, primer, propellant, bullet/shot, wad
- **Primers:** types and priming compositions
- **Propellants:** composition, burning characteristics, influence on performance
- **Velocity and pressure characteristics** under varying conditions

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- Types of projectiles/bullets and their compositional/design aspects (FMJ, hollow-point, wadcutter, shot, etc.)
- Recent trends in manufacturing and projectile design
- Identification of origin and features of improvised ammunition
- Safety aspects for handling firearms and ammunition (storage, transport, lab safety)

UNIT III — Internal, External & Terminal Ballistics

- **Internal ballistics:**
 - Ignition of propellants, propellant shape/size, burning behavior
 - Factors affecting internal ballistics: lock time, ignition time, barrel time, erosion, corrosion, gas cutting
- **External (external) ballistics:**
 - Equation of motion for projectiles; vacuum vs. real-world trajectories
 - Air resistance, base drag, yaw, stability, tumbling, ballistic coefficient, limiting velocity
 - Trajectory computation, use of ballistics tables, measurements of trajectory parameters
 - Introduction to automated trajectory computation systems and ballistics databases
- **Terminal ballistics (effect on target):**
 - Influence of bullet shape, striking velocity, striking angle, target material
 - Tumbling, cavitation, ricochet, intermediate targets, and their effects
 - Wound ballistics: evaluation of injuries from shotguns, rifles, handguns, and improvised firearms
 - Methods for measurement and documentation of wound-ballistic parameters
 - Differentiation between ante-mortem and post-mortem firearm injuries

UNIT IV — Identification, Marks & Forensic Procedures

- Principles & practice of identification of firearms, ammunition and components
- **Marks produced during firing:**
 - On cartridges: firing pin marks, breech face marks, chamber marks, extractor/ejector marks
 - On bullets: number/direction of lands and grooves, striation marks on lands/grooves
- Class vs. individual characteristics and their forensic significance
- **Obtaining test material:** methods to produce test fires and link fired ammunition to weapons

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- **Determination of range of fire:** indicators and terminology — burning, scorching, blackening, tattooing, metal fouling; shot dispersion and GSR distribution
- **GSR (Gunshot Residue):** mechanism of formation, sources, collection methods, spot/chemical tests, instrumental analysis and limitations
- **Examination methods & instrumentation:** stereo & comparison microscopy, automated bullet/cartridge matching systems, SEM-EDX, GC-MS for residues (overview)
- **Crime scene management & reconstruction:** search strategies, evidence recovery, safety considerations
- **Reconstruction of incidents:** differentiating suicide, homicide, accidental discharge, and self-defence scenarios
- **Report writing & courtroom presentation:** documentation, chain of custody, expert opinion basics

Reference Books – Firearms & Ballistics

1. **Firearms, the Law and Forensic Ballistics** – Brian J. Heard
2. **Textbook of Forensic Ballistics** – Charles E. O'Donnell
3. **Introduction to Firearms and Ballistics** – J. A. Jenkins
4. **Criminalistics: An Introduction to Forensic Science** – Richard Saferstein (Chapters on ballistics and firearms)
5. **Forensic Science: Fundamentals & Investigations** – Anthony J. Bertino (Ballistics sections)
6. **Gunshot Wounds: Practical Aspects of Firearms, Ballistics, and Forensic Techniques** – Vincent J. M. DiMaio
7. **Practical Guide for Forensic Experts: Firearms & Ballistics** – R. K. Sharma

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Program Name	B.Sc., Forensic Science	Semester	VI
Course Title	Forensic Ballistics Lab		
Course Code	BFS3672	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	4 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Forensic ballistics Lab

1. Identification of different types of firearms (rifled, smoothbore, handguns, rifles, improvised weapons) using models or images
2. Dismantling and assembling of firearm components (inert/safe models)
3. Examination and documentation of firearm parts for class characteristics
4. Identification of cartridge components and basic features
5. Comparison of test-fired bullets and cartridge cases using comparison microscopy (simulated or authorized range)
6. Determination of rifling characteristics: lands, grooves, twist direction, and caliber (using cast bullets or images)
7. Simple trajectory mapping using laser or mock-up targets (non-hazardous)
8. Demonstration of GSR deposition and collection techniques (simulated exercises)
9. Examination and comparison of marks on bullets and cartridge cases (striations, firing pin, breech marks)
10. Preparation of forensic reports and documentation for mock firearm incidents

Program Name	B.Sc., Forensic Science	Semester	VI
Course Title	Narcotic drugs and Psychotropic substances		
Course Code	BFS3604	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Narcotic drugs and psychotropic substances

Course Objective:

- Introduce students to the classification, chemistry, and pharmacology of narcotic drugs and psychotropic substances.
- Train students in detection, analysis, and interpretation of drug-related evidence in forensic investigations.
- Familiarize students with drug laws, control measures, and legal procedures in India and internationally.

Unit I: Introduction to Narcotic Drugs and Psychotropic Substances (8 Hours)

- Definition, scope, and significance in forensic science
- Historical background of narcotic drug use and regulation
- Sources of narcotic drugs: plant-based, synthetic, semi-synthetic
- Classification of drugs: opiates, opioids, stimulants, depressants, hallucinogens, cannabinoids, designer drugs
- Overview of psychotropic substances: anxiolytics, hypnotics, sedatives, antidepressants

Unit II: Chemistry and Pharmacology of Drugs (12 Hours)

- Chemical composition and structure of major narcotic drugs and psychotropic substances
- Pharmacokinetics: absorption, distribution, metabolism, excretion
- Pharmacodynamics: mechanism of action on central nervous system
- Effects of drugs on human body and behavior
- Toxicological effects and lethal doses
- Drug interactions and dependence potential

Unit III: Detection and Analysis of Drugs (10 Hours)

- Collection, preservation, and transportation of drug evidence
- Screening tests: color tests, spot tests, microcrystalline tests
- Chromatographic techniques: TLC, HPLC, GC
- Spectroscopic techniques: UV, IR, NMR, MS
- Immunoassays: ELISA, EMIT, RIA
- Interpretation of laboratory results

Unit IV: Drug Abuse, Adulterants, and Forensic Implications (10 Hours)

- Common patterns of drug abuse and administration routes
- Adulterants and diluents in street drugs
- Forensic significance of drug adulteration
- Biological specimens for drug analysis: blood, urine, hair, saliva
- Drug-facilitated crimes (rape, robbery, poisoning)

Unit V: Legal Framework and Case Studies (10 Hours)

- Narcotic Drugs and Psychotropic Substances Act, 1985 (NDPS Act, India)
- International conventions and treaties: Single Convention on Narcotic Drugs, UNODC regulations
- Role of forensic experts in drug-related cases
- Case studies on narcotic drug seizures, overdose, and poisoning
- Documentation, reporting, and presentation in court

Reference Books

1. **Forensic Science: Fundamentals & Investigations** – Anthony J. Bertino
2. **Textbook of Forensic Medicine and Toxicology** – Reddy K. S. N.
3. **Forensic Toxicology: Drugs, Alcohol, Poisons, and Chemicals** – S. S. Reddy & O. P. Chawla
4. **Handbook of Forensic Drugs** – I. G. Beasley
5. **Principles and Practice of Forensic Toxicology** – Barry Levine
6. **Forensic Science in Crime Investigation** – B. R. Sharma

Program Name	B.Sc., Forensic Science	Semester	VI
Course Title	Forensic Audio and Video		
Course Code	BFS3605	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Forensic Audio and Video

Course Objective:

- Introduce students to principles and techniques of audio and video evidence analysis.
- Train students in acquisition, enhancement, authentication, and interpretation of digital audio and video evidence.
- Develop skills for forensic reporting and courtroom presentation of multimedia evidence.

Unit I: Introduction to Forensic Audio and Video (8 Hours)

- Definition, scope, and significance in forensic science
- Types of audio and video evidence: recordings, surveillance footage, CCTV, smartphone media
- Basics of sound and image: frequency, amplitude, resolution, frame rate, compression
- Role of audio-video evidence in criminal and civil investigations
- Legal and ethical considerations in handling multimedia evidence

Unit II: Audio Forensics (12 Hours)

- Fundamentals of human voice and speech production
- Sound recording: analog and digital systems, microphones, media formats
- Audio signal processing: sampling, quantization, digitization
- Audio enhancement: noise reduction, filtering, normalization
- Speaker recognition: acoustic, linguistic, and spectrographic methods
- Authentication of audio recordings: detecting tampering, splicing, and editing
- Audio forensic tools and software

Unit III: Video Forensics (12 Hours)

- Basics of video capture, frame rate, and compression
- Types of video evidence: CCTV, dashcams, mobile phones, body cams
- Video enhancement: contrast, brightness, deblurring, stabilization
- Video authentication: detection of tampering, frame manipulation, deepfakes
- Forensic examination of video metadata and file properties
- Video analysis tools and software

Unit IV: Digital Evidence Acquisition and Handling (10 Hours)

- Collection and preservation of audio and video evidence
- Chain of custody and documentation
- File formats, codecs, and data integrity verification
- Recovery of deleted or corrupted multimedia files
- Handling encrypted or password-protected media

Unit V: Interpretation, Reporting & Case Studies (8 Hours)

- Interpretation of audio and video evidence for investigations
- Correlation of audio and video with other forensic evidence
- Preparation of forensic reports and expert testimony
- Case studies: criminal investigations using audio-video evidence
- Emerging trends: AI-based enhancement, deep learning for authentication, multimedia forensic databases

Reference Books

1. **Forensic Audio and Video Analysis** – Max M. Houck & Jay A. Siegel
2. **Digital Multimedia Forensics** – Anthony T. S. Ho
3. **Forensic Speaker Recognition** – Douglas A. Reynolds & John P. Campbell
4. **Multimedia Forensics and Security** – Nasir Memon & Sencun Zhu
5. **Handbook of Digital Forensics of Multimedia Data and Devices** – Anthony T. S. Ho & Shujun Li
6. **Principles of Forensic Audio Analysis** – John B. Barron

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Program Name	B.Sc., Forensic Science	Semester	VII
Course Title	Forensic Engineering		
Course Code	BFS4701	Course Credits	3
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Forensic engineering

Unit 1: Introduction to Forensic Engineering

- Definition, scope, and objectives of forensic engineering
- Importance in legal and industrial contexts
- Roles and responsibilities of a forensic engineer
- Relationship between engineering and law
- Types of investigations (accident, failure, product liability)

Unit 2: Failure Analysis

- Concepts of failure and accident
- Types of failures: structural, mechanical, electrical, and chemical
- Causes of failures: material defects, design flaws, manufacturing errors, maintenance lapses
- Methods of failure analysis:
 - Visual inspection
 - Non-destructive testing (NDT)
 - Metallurgical and chemical analysis
- Case studies of engineering failures

Unit 3: Investigation Techniques

- Steps in forensic engineering investigation
- Evidence collection and preservation
- Documentation and reporting
- Role of photographs, sketches, and diagrams
- Use of technology: sensors, data loggers, and forensic software

Unit 4: Legal Aspects and Ethics

- Legal framework governing forensic engineering in India
- Types of legal cases: civil, criminal, insurance claims
- Expert witness and testimony
- Ethics and professional responsibility of forensic engineers
- Standards and codes (IS, ASTM, ISO)

Unit 5: Specialized Forensic Investigations

- Fire and explosion analysis
- Structural collapses (buildings, bridges, dams)
- Mechanical and electrical accidents
- Vehicle accidents and crash investigations
- Failure of consumer products
- Emerging trends in forensic engineering: AI, IoT, predictive maintenance

Suggested Reference Books

1. *Forensic Engineering: Damage Assessments for Residential and Commercial Structures* – Kenneth L. Carper
2. *Forensic Engineering Investigation* – Barry S. Ferrell
3. *Engineering Failure Analysis* – ASM International
4. *Practical Guide to Forensic Engineering* – Robert T. Ratay

Program Name	B.Sc., Forensic Science	Semester	VII
Course Title	Forensic Engineering Lab		
Course Code	BFS4770	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	4 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Practical in Forensic Engineering

1. Material fracture analysis: ductile vs brittle failure
2. Fatigue testing of metals and components
3. Corrosion failure study of metals
4. Ultrasonic testing of welds and metal parts
5. Radiographic (X-ray) inspection of structural components
6. Magnetic particle inspection for crack detection
7. Dye penetrant test for surface defects
8. Structural model collapse analysis (beams/columns)
9. Mechanical failure analysis: broken shafts, gears, bearings
10. Electrical failure investigation: short circuits and insulation breakdown
11. Fire-damaged material study and burn pattern analysis
12. Accident reconstruction and forensic reporting (vehicle or machinery accidents)

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Program Name	B.Sc., Forensic Science	Semester	VII
Course Title	Forensic Anthropology & Odontology		
Course Code	BFS4702	Course Credits	3
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Forensic Anthropology & Odontology

UNIT I: Forensic Anthropology

- **Introduction:** Overview of forensic anthropology and its application in legal and criminal investigations.
- **Definition & Scope:** General definitions, scope, and significance in identifying human remains.
- **Anatomy & Physiology of Major Bones:**
 - Pelvis
 - Limb bones
 - Skull
 - Clavicle
 - Sternum

UNIT II: Determination of Age, Race, Sex, and Stature

- **Identification Methods:**
 - Sex determination using skeletal characteristics
 - Age estimation from bones
 - Race identification based on morphological features
 - Stature estimation from limb bones and skeletal remains
- **Additional Techniques:**
 - Morphological, anatomical, and chemical characteristics of bones
 - Personal identification through unique bodily features

UNIT III: Forensic Anthropometry / Osteometry

- **Personal Identity Determination:** Using bones and skeletal measurements
- **Superimposition Technique:** Methods of skeletal and photographic comparison

- **Video Image Analysis:** Role in identifying individuals
- **Facial Reconstruction:** Techniques and applications
- **Special Cases:**
 - Identification of burnt bones
 - Recovery and identification of skeletal remains in accidents, crimes, and mass disasters

UNIT IV: Forensic Odontology

- **Introduction:** Definition, scope, and significance in forensic investigations
- **Dentition:**
 - Types and patterns of teeth
 - Structure and anatomy of teeth
- **Applications in Identification:**
 - Age estimation from dentition
 - Personal identification using dental records
 - Role in mass disasters
- **Dental Pathology:** Diseases of teeth and their forensic significance

UNIT V: Bite Marks

- **Introduction & Scope:** Overview of bite marks in forensic science
- **Forensic Significance:** Use of bite marks in criminal investigations
- **Collection & Preservation:** Proper techniques to document bite marks
- **Examination & Analysis:** Identification and comparison methods
- **Medico-Legal Importance:** Legal relevance of bite mark evidence

Reference Books

Forensic Anthropology

1. *Forensic Anthropology: An Introduction* – Oxford University Press
2. *Introduction to Forensic Anthropology* – Steven N. Byers
3. *Forensic Anthropology: Contemporary Theory and Practice* – Lindsay & Ousley
4. *Human Osteology* – Tim D. White, Michael T. Black, Pieter A. Folkens
5. *The Human Skeleton in Forensic Medicine* – C. K. W. Lee

Program Name	B.Sc., Forensic Science	Semester	VII
Course Title	Forensic Anthropology & Odontology Lab		
Course Code	BFS4771	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	4 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Practical List for Forensic Anthropology & Odontology

1. **Study of Major Bones:** Identification and anatomical features of pelvis, limb bones, skull, clavicle, and sternum.
2. **Sex Determination from Skeleton:** Using pelvis, skull, and long bones.
3. **Age Estimation from Bones:** Using epiphyseal fusion, dental eruption, and wear patterns.
4. **Race Identification:** Morphological assessment of skull and facial features.
5. **Stature Estimation:** From long bones using standard anthropometric formulas.
6. **Personal Identification:** Using skeletal measurements and unique anatomical features.
7. **Superimposition Technique:** Comparing skeletal remains with photographs for identification.
8. **Facial Reconstruction:** Rebuilding facial features from skulls.
9. **Identification of Burnt Bones:** Techniques for analyzing charred or damaged skeletal remains.
10. **Dental Analysis:** Studying teeth types, patterns, and structures for identification.
11. **Age Estimation from Teeth:** Using eruption sequence and wear patterns.
12. **Bite Mark Analysis:** Collection, preservation, and comparison of bite marks for forensic investigation.

Program Name	B.Sc., Forensic Science	Semester	VII
Course Title	Wildlife Forensics		
Course Code	BFS4703	Course Credits	3
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Wildlife forensics

UNIT I: Introduction to Wildlife Forensics

- Definition, scope, and significance
- Role in conservation and law enforcement
- Types of wildlife crimes: poaching, trafficking, habitat destruction
- National and international legal frameworks (Wildlife Protection Act 1972, CITES, etc.)

UNIT II: Wildlife Species Identification

- Morphological identification of animals and plants
- Taxonomic methods for species identification
- Identification of threatened and endangered species
- Use of field guides and reference collections

UNIT III: Sample Collection and Preservation

- Collection of biological evidence: hair, feathers, bones, skin, blood, saliva
- Preservation and storage techniques for forensic analysis
- Documentation and maintaining chain of custody
- Handling decomposed or degraded samples

UNIT IV: Forensic Techniques in Wildlife

- DNA analysis and molecular identification
- Hair, feather, and bone analysis for species and age determination

- Isotope and chemical analysis for origin and diet tracing
- Trace evidence analysis from wildlife products

UNIT V: Wildlife Crime Investigation & Legal Aspects

- Investigation of poaching, smuggling, and illegal trade
- Role of forensic evidence in court
- Preparation of forensic reports and expert testimony
- Case studies of wildlife crime investigations
- International cooperation and enforcement

Reference Books

1. *Wildlife Forensic Investigation: Principles and Practice* – R. J. W. H. G. et al.
2. *Wildlife Forensics: Methods and Applications* – Robin W. K.
3. *Forensic Science in Wildlife Crime Investigation* – David W. Macdonald
4. *Molecular Markers in Wildlife Conservation* – George Amato
5. *Textbook of Wildlife Forensics* – Edited by R. Singh & A. K. Sharma

Program Name	B.Sc., Forensic Science	Semester	VII
Course Title	Wildlife Forensics Lab		
Course Code	BFS4772	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	4 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Wildlife Forensic Practical

1. Collection and preservation of wildlife evidence
2. Morphological identification of common wildlife species
3. Hair, feather, and bone analysis
4. DNA extraction and molecular identification (lab-based)
5. Forensic documentation and report preparation
6. Case study analysis of wildlife crime

Program Name	B.Sc., Forensic Science	Semester	VII
Course Title	Forensic Entomology		
Course Code	BFS4704	Course Credits	3
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Forensic entomology

UNIT I: Introduction to Forensic Entomology

- Definition, scope, and significance
- History and development of forensic entomology
- Role in medicolegal investigations
- Types of forensic entomology: urban, stored-product, and medico-legal

UNIT II: Insect Biology and Ecology

- Morphology and anatomy of insects
- Life cycle and development stages of forensic insects
- Classification and identification of insects important in forensics
- Ecology of necrophagous insects and their succession on carrion

UNIT III: Application in Medicolegal Cases

- Estimation of post-mortem interval (PMI) using insect evidence
- Factors affecting insect development: temperature, environment, season
- Analysis of wounds, trauma, and neglect using insects
- Identification of insect species from human and animal remains

UNIT IV: Collection, Preservation, and Analysis

- Collection of entomological evidence at crime scenes
- Preservation techniques for larval, pupal, and adult stages

- Laboratory rearing and observation of insect development
- Documentation, photography, and chain of custody

UNIT V: Advanced Techniques & Case Studies

- Molecular methods for insect identification
- Use of insects in toxicology and drug analysis
- Interpretation of insect evidence in court
- Review of notable forensic entomology case studies

Reference Books

1. *Forensic Entomology: The Utility of Arthropods in Legal Investigations* – Jason H. Byrd & James L. Castner
2. *Forensic Entomology: An Introduction* – Dorothy Gennard
3. *Manual of Forensic Entomology* – B. K. Sharma
4. *Forensic Science in Crime Investigation* – B. R. Sharma (Chapter on Entomology)
5. *Applied Entomology in Forensics* – Smith & Wall

Program Name	B.Sc., Forensic Science	Semester	VII
Course Title	Forensic Entomology Lab		
Course Code	BFS4773	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	4 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Forensic Entomology Practical

1. Identification of common forensic insects (flies, beetles, etc.)
2. Observation of life cycle and developmental stages
3. Collection and preservation of insect evidence from simulated samples
4. Estimation of post-mortem interval (PMI) in lab conditions
5. Laboratory rearing of larvae to adults
6. Preparation of entomological reports for forensic investigations

Program Name	B.Sc., Forensic Science	Semester	VII
Course Title	Research Methodology		
Course Code	BFS4705	Course Credits	3
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Research Methodology

UNIT I: Introduction to Research

- **Research Concepts:**
 - Definition, scope, and significance of research
 - Reflection, science, and research
 - Basic vs Applied Research
 - Essential steps in research
- **Literature Collection:**
 - Need for review of literature
 - Review process and bibliography
 - Research reading and discriminative reading
 - Consulting source material
 - Working bibliography, index cards, and reference cards

UNIT II: Literature Citation

- **Introduction to Citation:**
 - Importance of citing references
 - Different systems of citation
- **Citation Systems:**
 - **Name-Year System:**
 - List of references, placement of reference section
 - Alphabetical and chronological arrangement
 - Citation in text
 - **Citation-Sequence System**
 - **Alphabet-Number System**
 - Special cases: References without article title, journal abbreviations

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UNIT III: Research Report – Tables & Components

- **Components of a Research Report:**
 - Title, authors, and addresses
 - Abstract, summary, synopsis, and keywords
 - Introduction, materials and methods, results, discussion
 - Acknowledgements, general introduction, general discussion
 - Summary and conclusions, appendices, references
 - Plagiarism and ethical considerations
- **Tables in Research Reports:**
 - Need for tables and tabular form
 - Introduction and placement of tables
 - Numbering, titles, stub and box headings
 - Units of measurement and footnotes

UNIT IV: Research Report – Figures & Formatting

- **Figures in Research Reports:**
 - When and how to use figures
 - Numbering and captioning of figures
 - Preparation of photographs, microphotographs, and line diagrams
- **Formatting and Typing of Research Reports:**
 - Paper, margins, paragraph indentation
 - Spacing, alignment, hyphenation, fonts, pagination
 - Format of a thesis:
 - Title page, declaration, acknowledgement, table of contents
 - Abstract, list of tables, list of figures, list of abbreviations and symbols
 - Chapters, quotations, tables, figures, appendices, references

UNIT V: Experimental Designs

- **Introduction to Experimental Design:**
 - Observation, hypothesis, and null-hypothesis
 - Basic principles of experiments
- **Key Concepts:**
 - Experimental unit and sampling unit

- Experimental error, discrimination, replication, generalization
- Controls and randomization
- Measurement techniques
- **Common Experimental Designs:**
 - Overview of frequently used experimental designs in research

Ref. books-

1. C.R. Kothari & Gaurav Garg – *Research Methodology: Methods and Techniques*
2. Ranjit Kumar – *Research Methodology: A Step-by-Step Guide for Beginners*
3. K.N. Krishnaswamy et al. – *Management Research Methodology*
4. William G. Zikmund et al. – *Business Research Methods*
5. John W. Creswell & J.D. Creswell – *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*
6. Uma Sekaran & Roger Bougie – *Research Methods for Business*
7. Nicholas Walliman – *Research Methods: The Basics*

Program Name	B.Sc., Forensic Science	Semester	VII
Course Title	Entrepreneurship in Forensic Science		
Course Code	BFS4706	Course Credits	3
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Entrepreneurship in forensic science

UNIT I: Introduction to Entrepreneurship

- Definition and concepts of entrepreneurship
- Types of entrepreneurs: Innovators, replicators, and social entrepreneurs
- Characteristics, qualities, and skills of successful entrepreneurs
- Importance of entrepreneurship in the forensic science sector

UNIT II: Business Opportunities in Forensic Science

- Overview of forensic science services and market potential
- Types of forensic service enterprises: Crime labs, private testing labs, consulting services
- Emerging fields: Cyber forensics, digital forensics, forensic consultancy
- Identifying gaps and opportunities in the forensic industry

UNIT III: Business Planning and Development

- Concept and importance of a business plan
- Steps in setting up a forensic service business
- Legal and regulatory requirements for forensic enterprises in India
- Resource planning: Infrastructure, technology, manpower, and funding
- SWOT analysis (Strengths, Weaknesses, Opportunities, Threats)

UNIT IV: Marketing and Financial Management

- Marketing forensic services: Strategies and networking
- Branding, promotion, and client acquisition
- Pricing and service cost analysis
- Financial management: Budgeting, accounting, and funding sources
- Risk management and insurance

UNIT V: Challenges and Case Studies

- Common challenges in forensic entrepreneurship
- Ethical issues and professional responsibilities
- Success stories of forensic science startups and enterprises
- Practical case studies on forensic business models
- Strategies for innovation and sustainability in forensic services

Practical / Project Work

1. Market survey of forensic service demands in the region
2. Drafting a business plan for a forensic service enterprise
3. Feasibility study of setting up a private crime lab or forensic consultancy
4. SWOT analysis of an existing forensic startup
5. Role-play or simulation of client interaction and service marketing
6. Analysis of case studies of successful forensic enterprises

Reference Books

1. *Entrepreneurship* – Hisrich, Peters & Shepherd
2. *Innovation and Entrepreneurship* – Peter F. Drucker
3. *Entrepreneurship in Science and Technology* – Donald F. Kuratko
4. *Forensic Science: Business and Management Perspectives* – Edited by R. Singh
5. *Entrepreneurship Development in India* – S. S. Khanka

SEMESTER-VIII

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Program Name	B.Sc., Forensic Science	Semester	VII
Course Title	Forensic Medicine		
Course Code	BFS4801	Course Credits	3
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Forensic Medicine

UNIT I: Introduction to Forensic Medicine

- Definition, scope, and importance of forensic medicine
- Relationship with law and other forensic sciences
- Medical ethics, consent, and legal responsibilities
- Sources of medico-legal knowledge: Statutes, case laws, and guidelines

UNIT II: Medico-Legal Examination

- Examination of living persons:
 - Injuries: Classification, documentation, and medico-legal significance
 - Sexual assault cases: Examination, evidence collection, and reporting
 - Domestic violence and child abuse cases
- Examination of deceased persons:
 - Post-mortem examination
 - Identification of cause and time of death
 - Documentation and preservation of evidence

UNIT III: Injuries and Wounds

- Mechanical injuries: Blunt, sharp, firearm injuries
- Thermal injuries: Burns and scalds
- Chemical injuries: Acids, alkalis, and toxins
- Electrical injuries
- Patterned injuries and their significance in crime investigation

UNIT IV: Asphyxia and Sudden Deaths

- Types of asphyxia deaths: Strangulation, suffocation, drowning, hanging, chemical asphyxia
- Sudden natural deaths: Cardiac, respiratory, and cerebrovascular causes
- Post-mortem changes and estimation of time since death

UNIT V-Special Topics

- Medico-legal aspects of pregnancy, sexual offenses, and neonaticide
- Medical negligence and malpractice
- Forensic odontology: Bite marks, dental identification
- Forensic anthropology: Skeletal examination, age, sex, and stature determination

Reference Books

1. *Textbook of Forensic Medicine & Toxicology* – R. K. Sharma
2. *Principles of Forensic Medicine* – K. S. Narayan Reddy
3. *Forensic Medicine and Toxicology* – C. K. Parikh
4. *K. S. Narayan Reddy's The Essentials of Forensic Medicine* – Latest Edition
5. *Forensic Medicine: Clinical and Pathological Aspects* – Jason Payne-James

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Program Name	B.Sc., Forensic Science	Semester	VII
Course Title	Forensic Medicine Lab		
Course Code	BFS4870	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	4 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Forensic Medicine Practical

1. Examination and documentation of injuries on models or simulated cases
2. Post-mortem demonstration (where permitted)
3. Identification and handling of medico-legal specimens
4. Collection and preservation of biological evidence
5. Interpretation of toxicology reports and lab findings
6. Medico-legal report writing

Program Name	B.Sc., Forensic Science	Semester	VII
Course Title	DNA Profiling		
Course Code	BFS4802	Course Credits	3
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

DNA Profiling

UNIT I: Introduction to DNA Profiling

- Definition, scope, and significance of DNA profiling in forensic investigations
- Historical development and milestones in forensic DNA analysis
- Types of biological evidence: blood, saliva, semen, hair, tissue

UNIT II: DNA Structure and Function

- Structure and organization of DNA: Nucleotides, double helix, chromatin, chromosomes
- Types of DNA: Nuclear DNA vs Mitochondrial DNA
- DNA replication, transcription, and translation
- Genetic markers used in forensic analysis

UNIT III: Techniques in DNA Profiling

- Extraction of DNA from biological samples
- Quantification and quality assessment of DNA
- PCR (Polymerase Chain Reaction) techniques
- STR (Short Tandem Repeat) analysis and VNTR (Variable Number Tandem Repeat)
- RFLP (Restriction Fragment Length Polymorphism)
- Electrophoresis and DNA sequencing methods
- Mitochondrial DNA analysis for degraded samples

UNIT IV: Applications of DNA Profiling in Forensics

- Human identification in crime investigations

- Paternity and relationship testing
- Identification of disaster victims and missing persons
- Wildlife forensics and species identification
- Legal and ethical considerations in DNA analysis

UNIT V: Quality Control, Interpretation, and Reporting

- Quality assurance in forensic DNA laboratories
- Contamination prevention and sample handling
- Statistical interpretation of DNA evidence
- Preparation of forensic DNA reports and court testimony
- Case studies illustrating successful use of DNA profiling

Reference Books

1. *Forensic DNA Typing: Biology, Technology, and Genetics of STR Markers* – John M. Butler
2. *Principles of Forensic DNA Profiling* – David Owen
3. *Forensic DNA Analysis: Current Practices and Emerging Technologies* – Dr. Bruce Budowle
4. *Molecular Biology and Forensic DNA Typing* – Editors: T. S. Patterson & R. Budowle
5. *Forensic Science: An Introduction to Scientific and Investigative Techniques* – Stuart H. James & Jon J. Nordby (Chapters on DNA profiling)

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Program Name	B.Sc., Forensic Science	Semester	VII
Course Title	DNA Profiling Lab		
Course Code	BFS-4871	Course Credits	2
Contact Hours	56	Duration Of SEA/Exam	4 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

DNA Profiling Practical

1. Collection and preservation of DNA samples from biological evidence
2. Extraction of DNA from blood, hair, or saliva samples
3. Quantification and quality assessment of DNA
4. PCR amplification of DNA markers
5. Gel electrophoresis for DNA fragment separation
6. Interpretation of STR profiles and comparison with reference samples
7. Mock case study: DNA analysis for forensic identification

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Program Name	B.Sc., Forensic Science	Semester	VII
Course Title	Forensic accounting and Fraud examination		
Course Code	BFS4803	Course Credits	3
Contact Hours	56	Duration Of SEA/Exam	3 hrs.
Formative Assessment Marks	30	Summative Assessment Marks	70

Forensic Accounting and Fraud examination

UNIT I: Introduction to Forensic Accounting

- Definition, scope, and significance of forensic accounting
- Evolution and role in financial investigations
- Key skills and qualities of a forensic accountant
- Differences between traditional accounting and forensic accounting
- Ethical considerations and professional responsibilities

UNIT II: Fraud and Its Detection

- Definition and types of fraud: financial statement fraud, asset misappropriation, corruption
- Causes and consequences of fraud
- Fraud detection techniques
- Red flags and warning signs of fraud
- Fraud risk assessment and internal controls

UNIT III: Forensic Accounting Techniques

- Investigation procedures in forensic accounting
- Data analysis and forensic auditing techniques
- Use of technology in fraud detection: software tools and analytics
- Documentation and evidence preservation for legal purposes
- Reporting findings to management and law enforcement

UNIT IV: Legal and Investigative Aspects

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- Legal framework governing financial crimes
- Role of forensic accountants in litigation and dispute resolution
- Expert witness testimony and court procedures
- Case studies of fraud examination
- Prevention strategies and fraud risk management

Reference Books

1. *Forensic Accounting and Fraud Examination* – William S. Hopwood, Jay J. Leiner, George R. Young
2. *Principles of Fraud Examination* – Joseph T. Wells
3. *Forensic Accounting* – Joseph T. Wells
4. *Financial Statement Fraud: Prevention and Detection* – Zabihollah Rezaee
5. *Fraud Auditing and Forensic Accounting* – Tommie W. Singleton

RESEARCH PROJECT (Credit-6)



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