

## **B.Sc. in Forensic Sciences & Toxicology 4 Years (8 Semesters)**

**Overview:** B.Sc. in Forensic Sciences and Toxicology is an interdisciplinary undergraduate program that combines the principles of forensic science, biology, chemistry, and toxicology to investigate crimes, accidents, and environmental hazards. The program prepares students to apply scientific methods to analyze physical evidence, identify substances, and understand their effects on the human body, especially in criminal investigations and public health contexts. With a focus on laboratory techniques, legal procedures, and toxicological analysis, the program equips students for careers in law enforcement, legal systems, toxicology research, public health, and forensic laboratories.

Graduates can contribute to crime scene investigations, medical forensics, and toxicological analysis in both criminal justice and environmental fields. This program is essential for students interested in the intersection of science, law, and healthcare.

Affiliated Institution: School of Medical Sciences and Technology, Malla Reddy Vishwavidyapeeth (Deemed to be University)\*\* The minimum eligibility for B.Sc. Forensic Sciences and Toxicology is a pass in 10+2 with at least 50% marks in Physics, Chemistry and Biology from a recognized board (CBSE/ISC/PUC) or equivalent

## **Key Highlights:**

- 1. **Interdisciplinary Approach**: The program combines biology, chemistry, criminology, and toxicology to prepare students for diverse roles in forensic and toxicological science.
- 2. Crime Scene Investigation Techniques: Students learn techniques for collecting, preserving, and analyzing forensic evidence at crime scenes.
- 3. Laboratory and Analytical Skills: The program includes practical training in forensic and toxicological laboratories to analyze physical evidence such as blood, hair, drugs, and toxic substances.
- 4. **Toxicology Focus**: A significant portion of the program focuses on the identification and analysis of toxic substances, understanding their effects on the human body, and their role in criminal investigations and public health.
- 5. **Career Pathways**: Graduates can pursue careers in forensic laboratories, law enforcement agencies, toxicology research, and environmental monitoring, among others.

## **Course Curriculum:**

The B.Sc. in Forensic Sciences & Toxicology is typically a three-year program that offers theoretical knowledge and hands-on laboratory experience. Below is an outline of the curriculum:

Year 1:





- Introduction to Forensic Science
- General Biology and Human Anatomy
- Basic Chemistry and Organic Chemistry
- Introduction to Toxicology
- Criminal Law and Evidence
- Principles of Crime Scene Investigation
- Biostatistics and Research Methods
- Laboratory Techniques in Forensic Sciences

#### Year 2:

- Forensic Biology and DNA Profiling
- Principles of Toxicology
- Forensic Chemistry and Analysis
- Forensic Psychology
- Pharmacology and Pharmacokinetics
- Forensic Toxicology and Drug Analysis
- Medico legal Aspects of Toxicology
- Bloodstain Pattern Analysis and Ballistics

#### Year 3:

- Advanced Forensic Toxicology
- Forensic Anthropology and Odontology
- Environmental Toxicology and Pollution
- Forensic Pathology and Autopsy Techniques
- Forensic Serology and Microbiology
- Toxicology in Legal Investigations
- > Advanced Crime Scene Investigation
- > Internship or Research Project in Forensic Sciences and Toxicology

#### Additional/Optional Modules:

- Forensic Toxicology in Drug Overdose Cases
- ► Forensic Pharmacology and Drug Testing
- Firearm and Explosive Analysis
- Digital Forensics and Cybercrime
- Forensic Toxicology in Environmental Cases
- > Courtroom Testimony and Expert Witness Skills

## **Career and Academic Opportunities:**

#### **Career Opportunities:**

Graduates of B.Sc. in Forensic Sciences & Toxicology can explore career options in law enforcement, legal consulting, public health, toxicology research, and forensic science. Some of the career paths include:



- Forensic Scientist: Working in forensic laboratories to analyze physical evidence, including biological fluids, fibers, and chemicals.
- Forensic Toxicologist: Specializing in the analysis of drugs, alcohol, poisons, and other toxic substances to determine their role in crimes, accidents, or health issues.
- Crime Scene Investigator (CSI): Collecting and preserving evidence at crime scenes, then analyzing it to help solve criminal cases.
- Medicolegal Expert: Providing expertise in toxicological analysis for legal investigations, including postmortem toxicology reports and testimonies in court.
- Environmental Toxicologist: Monitoring and analyzing the effects of environmental contaminants and toxins on ecosystems and public health.
- Pharmacologist: Studying the effects of drugs and chemicals on the human body and their applications in forensic investigations.
- Public Health Toxicologist: Investigating environmental pollutants, poisons, and chemicals to protect public health.
- Forensic Lab Technician: Working in laboratories to assist in the preparation, analysis, and reporting of forensic evidence.
- Legal Consultant: Providing expertise to law firms in criminal cases involving toxic substances, drugs, and poisons.

## Academic Opportunities:

Graduates of B.Sc. in Forensic Sciences & Toxicology can pursue higher studies to specialize further in toxicology, forensic science, or criminology. Postgraduate programs include:

- Master's in Forensic Science: A specialized program that deepens knowledge in various aspects of forensic science, including DNA analysis, crime scene investigation, and toxicology.
- Master's in Toxicology: Offering advanced studies in chemical and biological toxicology, including drug toxicity, forensic toxicology, and environmental toxicology.
- Master's in Criminology: Focusing on criminal behavior, criminal justice systems, and the role of forensic science in law enforcement and criminal investigations.
- Master's in Forensic Pathology: A medical field that specializes in the study of the cause of death, particularly in cases involving toxic substances.
- Master's in Environmental Science or Environmental Toxicology: Focusing on the impact of pollutants and chemicals on the environment and human health.

Ph.D. programs in **Forensic Science**, **Toxicology**, or **Criminal Justice** are available for those pursuing careers in research or academia.

## **Professional Opportunities:**

- Certified Forensic Toxicologist (CFT): A certification for professionals specializing in forensic toxicology, involving drug and alcohol testing and analysis.
- Forensic Scientist Certification: Various certifications offered by professional organizations to validate expertise in forensic science and laboratory analysis.



- Certified Crime Scene Investigator (CCSI): Certification for professionals working directly in crime scene investigation, ensuring evidence collection and analysis standards are met.
- Certified Medicolegal Death Investigator (CMDI): Certification for professionals involved in investigating death cases, particularly those related to toxicology and substance abuse.
- Toxicology Certification: Certification for toxicologists specializing in environmental, industrial, or forensic toxicology.
- Courtroom Expert Witness Certification: For professionals providing expert testimony in court regarding forensic toxicology or crime scene analysis.

## Higher Education and Research Prospects:

- Research Opportunities: Forensic science and toxicology offer exciting research opportunities in areas such as crime scene investigation, toxicological drug analysis, environmental toxicology, and new techniques for detecting substances in biological samples.
- Postgraduate Studies: Graduates can pursue specialized postgraduate degrees, such as Master's in Forensic Science, Master's in Toxicology, or Master's in Criminology, to gain deeper knowledge in these fields.
- Ph.D. Programs: For those interested in advanced research, pursuing a Ph.D. in Forensic Science, Toxicology, or Criminal Justice will open doors to careers in academia, research institutes, and government agencies focused on crime prevention and forensic investigations.
- Interdisciplinary Research: Graduate students may collaborate on interdisciplinary research projects, including the development of new forensic techniques, drug testing methods, or improving environmental and public health toxicology standards.

## **Conclusion:**

The **B.Sc. in Forensic Sciences & Toxicology** is a highly interdisciplinary program designed to equip students with the skills and knowledge required for careers at the intersection of science, law, and healthcare. With a strong focus on practical training in forensic labs, crime scene investigation, and toxicological analysis, this program is ideal for students passionate about solving crimes, investigating toxins, and protecting public health.

Graduates can pursue rewarding careers in forensic science, toxicology, environmental health, criminal justice, and law enforcement, with further opportunities for specialization through postgraduate education and certifications. The program also provides ample opportunities for research in crime science, drug analysis, and toxicology-related fields.

# Labs

## 1. Forensic Biology & Serology Lab

Purpose: Examination of biological evidence like blood, saliva, and hair in criminal investigations.



## > Equipment & Facilities:

- ✓ Microscopes (stereo, compound, phase-contrast)
- ✓ DNA extraction and PCR machines
- ✓ Blood detection kits (luminol, Kastle-Meyer test)
- ✓ Semen and saliva identification kits
- ✓ ABO and Rh blood grouping kits

## 2. Forensic Chemistry & Toxicology Lab

- > **Purpose**: Identification of drugs, poisons, and chemical substances in forensic cases.
- > Equipment & Facilities:
  - ✓ Gas Chromatography-Mass Spectrometry (GC-MS)
  - ✓ High-Performance Liquid Chromatography (HPLC)
  - ✓ UV-Visible and Infrared (IR) Spectrophotometers
  - ✓ Arsenic, cyanide, and heavy metal detection kits
  - ✓ Alcohol and drug testing kits (breath analyzers, immunoassays)

## 3. Crime Scene Investigation (CSI) Lab

- Purpose: Practical training in collecting, preserving, and analyzing crime scene evidence.
- > Equipment & Facilities:
  - ✓ Fingerprint development kits (powder, cyanoacrylate fuming)
  - ✓ Footprint and tire track impression kits
  - ✓ Blood spatter analysis tools
  - ✓ UV and alternate light sources for evidence detection
  - ✓ Crime scene reconstruction software

## 4. Digital & Cyber Forensics Lab

> **Purpose**: Investigating cybercrimes, data breaches, and digital evidence analysis.

### > Equipment & Facilities:

- ✓ Computer forensic analysis software (FTK, EnCase)
- ✓ Mobile forensics tools (Cellebrite, Oxygen Forensic Suite)
- ✓ Network security and intrusion detection tools
- ✓ Password recovery and decryption software
- $\checkmark$  Hard drive imaging and data recovery tools

## 5. Forensic Physics & Ballistics Lab

- > **Purpose**: Study of firearms, ammunition, and physical evidence analysis.
- > Equipment & Facilities:
  - ✓ Bullet trajectory analysis kits



- ✓ Comparison microscopes for ballistics
- ✓ Gunpowder residue detection kits (Griess test)
- ✓ 3D imaging for bullet and tool mark analysis
- ✓ Glass, paint, and fiber analysis kits

## 6. Document Examination & Handwriting Analysis Lab

- > **Purpose**: Authentication of signatures, handwriting, and counterfeit detection.
- > Equipment & Facilities:
  - ✓ VSC (Video Spectral Comparator) for document examination
  - ✓ UV, IR, and electrostatic detection apparatus (ESDA)
  - ✓ Ink analysis using chromatography
  - ✓ Handwriting comparison software
  - ✓ Typewriting and printer analysis tools

## 7. Forensic Anthropology & Odontology Lab

- > **Purpose**: Identification of human remains and bite mark analysis.
- > Equipment & Facilities:
  - ✓ Skeletal remains and bone identification models
  - ✓ 3D facial reconstruction software
  - ✓ Dental impression kits and bite mark analysis tools
  - ✓ Age and gender determination kits
  - ✓ Decomposition study setups

## 8. Forensic Psych<mark>ology & Po</mark>lygraph Testing Lab

- > **Purpose**: Behavioral analysis, lie detection, and psychological profiling.
- Equipment & Facilities:
  - ✓ Polygraph (Lie Detector) machines
  - ✓ EEG and biofeedback systems
  - ✓ Psychological assessment and profiling tools
  - ✓ Facial expression and voice stress analysis software
  - ✓ Simulated interrogation room setups



# PROGRAM OUTCOMES (POs)

РО	Program Outcomes		
PO-1	Scientific Understanding & Application Develop a strong foundation in forensic science principles, criminal investigation techniques, and laboratory analysis, integrating knowledge from biology, chemistry, and physics to solve forensic cases.		
PO-2	Analytical and Problem-Solving Skills Apply critical thinking, logical reasoning, and analytical techniques to evaluate forensic evidence, interpret crime scene findings, and support legal proceedings with scientific accuracy.		
PO-3	Ethical and Legal Awareness Demonstrate knowledge of ethical standards, legal procedures, and professional responsibilities in forensic investigations, ensuring compliance with judicial and law enforcement guidelines.		
PO-4	Technical Proficiency & Instrumentation           Gain hands-on experience with modern forensic technologies, laboratory instruments, and crime scene analysis tools, enabling precise data collection and interpretation in forensic investigations.		
PO-5	Communication & Research Competency Develop effective communication skills for presenting forensic reports, expert testimonies, and scientific findings while fostering research aptitude for advancements in forensic methodologies.		





## COURSE STRUCTURE – B.Sc. Forensic Sciences& Toxicology

## Semester 1

SI		Course			Contact		
No.	Broad Category	Code	Code         Name of the Subject/Practical	ho T	urs/we T	ek D	Credits
1	Curregory	BSFS101	Introduction to Foransia Science	2	1	0	3
1.		DEELIOO	Fundamentals of Criminalary & Criminal	2	1	0	5
2.	Major (Core)	DSF3102	Justice System	2	1	0	3
3.		BSFS103	Principles of Forensic Toxicology	2	1	0	3
4.		BSFS104	Crime Scene Investigation & Evidence	1	0	2	2
	-	DOEGIOS	Collection				
5.	Minor Select any two minor courses, each worth 2 credits, for a	BSFS105	<ol> <li>Basics of Digital &amp; Cyber Forensics</li> <li>Introduction to Environmental &amp; Industrial Toxicology</li> <li>Forensic Anthropology &amp; Human Identification</li> </ol>	1	1	0	4
	maximum of 4 credits per semester		<ol> <li>Introduction to Ballistics &amp; Firearm Examination</li> <li>Fingerprint Analysis &amp; Handwriting Examination</li> </ol>	1	1	0	
-	Skill	BSFS106	1.Crime Scene Photography & Documentation	0	0	2	
6.	Enhancement Courses		2.Toxicological Sample Collection & Preservation	0	0	2	2
	Ability	BSFS107	1. English Communication Skills			V	5
7.	Enhancement		2. Report Writing & Documentation in	0	0	2	1
/.	Courses		Forensic Investigations				
8.	Value-Added Courses	BSFS108	<ol> <li>Role of DNA Analysis in Forensic Investigations</li> <li>Introduction to Poisons &amp; Their Effects on the Human Body</li> </ol>	1	0	2	2
<b>Total</b> 10 5 10 20							20
Total Contact Hours					25		20



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# **Course outcomes for B.Sc. Forensic Sciences MAJOR- Introduction to Forensic Science**

Sr. No.	Course Outcome	Description
1	Understand the Role of Forensic Science in Criminal Justice	Define forensic science and explain its role in solving crimes and supporting the criminal justice system through scientific methods and evidence analysis.
2	Explore the Different Branches of Forensic Science	Identify the various branches of forensic science, such as forensic biology, chemistry, toxicology, and anthropology, and their contributions to criminal investigations.
3	Learn the Basics of Evidence Collection	Understand the importance of evidence collection, preservation, and chain of custody in forensic investigations.
4	Study the Techniques Used in Forensic Investigations	Learn about the techniques used in forensic science, including fingerprint analysis, DNA profiling, bloodstain pattern analysis, and toxicology testing.
5	Apply Forensic Science to Real-World Cases	Analyze case studies to apply forensic science principles in real- world criminal investigations and understand how forensic evidence is used in court.
6	Understand the Ethical Considerations in Forensic Science	Examine the ethical responsibilities of forensic scientists, including maintaining objectivity, confidentiality, and the integrity of forensic findings.
7	Explore the Role of Forensic Experts in Legal Proceedings	Understand the role of forensic experts in providing expert testimony, presenting evidence in court, and assisting law enforcement agencies in solving crimes.
8	Analyze the Use of Technology in Forensic Investigations	Explore how modern technology, including digital forensics, robotics, and advanced imaging, is used in the field of forensic science to solve crimes more efficiently.

# Course outcomes for B.Sc. Forensic Sciences MAJOR-Fundamentals of criminology & criminal Justice Systems

Sr. No.	Course Outcome	Description
1	Understand the Basics of Criminology	Define criminology and explain its role in studying criminal behavior, crime causation, and the societal impact of crime.



Sr. No.	Course Outcome	Description
2	Explore the Structure of the Criminal Justice System	Understand the components of the criminal justice system, including law enforcement, judiciary, and corrections.
3	Study Criminological Theories	Learn about different theories of crime, including classical, biological, sociological, and psychological explanations for criminal behavior.
4	Investigate the Process of Criminal Investigation	Explore the steps in criminal investigations, from crime detection to trial, including the role of law enforcement and forensic experts.
5	Analyze the Role of Law and Social Justice	Understand how law enforcement and legal systems operate within the framework of social justice, human rights, and ethical practices.
6	Examine the Impact of Crime on Society	Analyze the effects of crime on victims, communities, and society at large, and explore the concept of recidivism and rehabilitation in the criminal justice system.
7	Apply Criminological Knowledge to Real-World Cases	Evaluate case studies to apply criminological theories and criminal justice procedures to solve complex criminal cases.

## Course outcomes for B.Sc. Forensic Sciences MAJOR-Principles of Forensic Toxicology

Sr. No.	Course Outcome	Description
1	Understand the Basics of Forensic Toxicology	Define forensic toxicology and its role in analyzing and identifying toxic substances involved in criminal investigations, such as drugs, alcohol, and poisons.
2	Explore the Analysis of Biological Samples	Learn about the methods used in forensic toxicology for analyzing biological samples (blood, urine, tissues) to detect the presence of toxins or substances.
3	Study the Mechanisms of Toxicity in the Human Body	Understand how toxic substances affect human physiology and their absorption, distribution, metabolism, and excretion.
4	Investigate the Role of Forensic Toxicology in Crime Scene Investigations	Learn how forensic toxicologists contribute to crime scene investigations by providing vital information about toxic exposure and cause of death.



Sr. No.	Course Outcome	Description
5	Explore Common Toxicological Substances and Their Effects	Study the common toxic substances (e.g., narcotics, pesticides, alcohol, poisons) and their effects on the human body, and how they are analyzed in forensic cases.
6	Apply Forensic Toxicology Techniques to Real-World Scenarios	Analyze case studies to apply toxicological analysis methods in forensic investigations, focusing on identifying substances, interpreting results, and legal implications.
7	Understand Ethical and Legal Issues in Forensic Toxicology	Explore the ethical challenges and legal considerations involved in forensic toxicology, including chain of custody, reporting findings, and courtroom testimony.

## Course outcomes for B.Sc. Forensic Sciences MAJOR- Crime Scene Investigation & Evidence Collection

Sr. No.	Course Outcome	Description
1	Understand the Importance of Crime Scene Investigation	Define crime scene investigation and its significance in the criminal justice system, highlighting its role in solving crimes through evidence collection and analysis.
2	Learn the Crime Scene Procedures and Protocols	Study the procedures involved in securing and documenting a crime scene, ensuring proper evidence collection and maintaining chain of custody.
3	Explore Different Types of Evidence	Understand the different types of evidence (e.g., physical, biological, digital, trace) and how each contributes to the investigation and prosecution of criminal cases.
4	Study Techniques for Evidence Collection and Preservation	Learn the methods for collecting and preserving various types of evidence, such as fingerprints, DNA, firearms, and trace evidence, ensuring that they are properly handled.
5	Investigate the Role of Forensic Experts in Evidence Analysis	Understand how forensic experts analyze evidence and present their findings in court, contributing to the development of a case.
6	Apply Crime Scene Investigation Skills to Real-World Cases	Evaluate real-life case studies to apply the knowledge and skills learned in crime scene investigation and evidence collection, emphasizing practical, hands-on techniques.



Sr. No.	Course Outcome	Description
7	Understand the Ethical and Legal Considerations in Crime Scene Investigation	Examine the ethical responsibilities and legal considerations in handling crime scene evidence, including issues of privacy, integrity, and the admissibility of evidence.

# Course outcomes for B.Sc. Forensic Sciences MINOR-Basics of digital & cyber forensics

Sr. No.	Course Outcome	Description
1	Understand the Fundamentals of Digital Forensics	Define digital forensics and explore its importance in investigating cybercrimes, data breaches, and electronic evidence collection.
2	Explore the Types of Cybercrimes	Learn about different types of cybercrimes, including hacking, identity theft, cyberbullying, and fraud, and their impact on individuals and organizations.
3	Study Digital Evidence Collection Methods	Understand the methods and tools used in collecting and preserving digital evidence from various sources, including computers, mobile devices, and networks.
4	Investigate Cyb <mark>ercrime</mark> Investigation Techniques	Learn the techniques used in cybercrime investigations, including network forensics, email analysis, and data recovery.
5	Understand Lega <mark>l and</mark> Ethical Issues in Digital Forensics	Examine the legal and ethical issues surrounding digital forensics, such as privacy, data protection laws, and the admissibility of digital evidence in court.
6	Explore the Role of Digital Forensics in the Legal System	Learn how digital forensics experts contribute to criminal investigations, legal proceedings, and how they provide expert testimony in court.
7	Apply Digital Forensics to Real-World Cybercrime Cases	Analyze case studies to apply the knowledge of digital forensics tools and techniques to solve real-world cybercrimes, ensuring legal compliance and ethical standards.
8	Learn About Cybersecurity Measures in Forensics	Understand the role of cybersecurity in digital forensics, focusing on securing digital evidence, preventing data breaches, and maintaining data integrity during investigations.



## Course outcomes for B.Sc. Forensic Sciences MINOR- Introduction to Environmental & Industrial Toxicology

Sr. No.	Course Outcome	Description
1	Understand the Basics of Environmental Toxicology	Define environmental toxicology and explore how pollutants and toxic substances affect ecosystems, wildlife, and human health.
2	Study the Principles of Toxicology in Environmental Health	Learn the fundamental principles of toxicology, including the mechanisms of toxicity, dose-response relationships, and how pollutants impact environmental health.
3	Investigate the Effects of Environmental Pollutants on Human Health	Explore the health effects of common environmental pollutants such as air and water contaminants, pesticides, and heavy metals, and their links to diseases and health issues.
4	Understand Industrial Toxicology and Its Impact on Workers	Learn about industrial toxicology, focusing on hazardous substances used in manufacturing, mining, and other industrial sectors and their potential effects on workers' health.
5	Explore the Role of Environmental Regulations and Standards	Study the regulatory frameworks and standards used to control exposure to toxic substances, including environmental laws, risk assessment, and safety protocols.
6	Analyze Environmental Accidents and Toxic Spills	Examine case studies of environmental toxic accidents, chemical spills, and their long-term effects on the environment and human populations.
7	Apply Toxicological Knowledge to Environmental and Industrial Cases	Analyze real-world case studies to apply the knowledge of toxicological principles in managing industrial and environmental hazards, including risk assessment and mitigation strategies.
8	Understand the Role of Environmental Toxicology in Public Health	Explore how environmental toxicology contributes to public health policies, risk management strategies, and the prevention of pollution-related health issues.

**Course outcomes for B.Sc. Forensic Sciences MINOR- Forensic Anthropology & Human Identification** 



Sr. No.	Course Outcome	Description
1	Understand the Role of Forensic Anthropology in Criminal Investigations	Define forensic anthropology and explore its role in the identification of human remains and the determination of cause of death in criminal cases.
2	Study Human Skeletal Anatomy and Identification Methods	Learn the structure and function of the human skeleton and how forensic anthropologists use skeletal remains to determine key characteristics such as age, sex, and ancestry.
3	Explore Techniques for Human Identification from Skeletal Remains	Understand the various techniques used by forensic anthropologists, including DNA analysis, facial reconstruction, and dental records, to identify individuals from skeletal remains.
4	Investigate the Methods for Estimating Time Since Death	Study the methods used to estimate the post-mortem interval (PMI) by analyzing skeletal and other human remains, as well as environmental factors affecting decomposition.
5	Examine Trauma and Pathological Conditions in Human Remains	Learn how forensic anthropologists analyze trauma (such as fractures or gunshot wounds) and pathological conditions (such as diseases or congenital defects) in human remains.
6	Understand the Legal and Ethical Aspects of Human Identification	Explore the ethical and legal considerations in forensic anthropology, including issues of consent, privacy, and handling of human remains in a criminal investigation.
7	Apply Forensic Anthropology to Real-World Case Studies	Analyze case studies to apply anthropological techniques in the identification of human remains, and interpret the evidence for use in criminal investigations and court cases.
8	Explore the Role of Forensic Anthropologists in Legal Proceedings	Understand the role of forensic anthropologists in providing expert testimony, presenting findings in court, and assisting law enforcement in solving cases involving unidentified remains.

**Course outcomes for B.Sc. Forensic Sciences MINOR- Introduction to Ballistics & Firearm Examination** 



Sr. No.	Course Outcome	Description
1	Understand the Basics of Forensic Ballistics	Define forensic ballistics and explain its role in criminal investigations, focusing on the behavior of firearms and ammunition, and the analysis of ballistic evidence.
2	Explore Firearm Identification and Functionality	Learn about the different types of firearms, their components, and how they function. Understand the various characteristics of firearms that are examined in criminal cases.
3	Study the Principles of External and Internal Ballistics	Understand the principles of external and internal ballistics, including projectile movement, trajectory, and the effects of gunpowder, gunshot, and barrel characteristics.
4	Learn Techniques for Firearm Examination and Evidence Collection	Explore methods for examining firearms and their ammunition, including identifying markings, cartridge cases, bullets, and firing pin impressions to link firearms to a crime.
5	Investigate Gunshot Residue (GSR) and Its Forensic Significance	Understand the methods for collecting and analyzing gunshot residue (GSR) to determine if a suspect has recently discharged a firearm and to link them to a crime scene.
6	Analyze the Role of Ballistics in Crime Scene Investigation	Study how ballistic evidence, including bullet trajectory, firearm matching, and gunshot residue, is used to reconstruct the events of a crime.
7	Apply Firearm Examination Techniques to Real-World Cases	Analyze real-world case studies to apply ballistic and firearm examination techniques in solving criminal cases, particularly homicides and shootings.
8	Understand the Role of Ballistics in Legal Proceedings	Learn how forensic ballistics experts provide testimony in court, presenting ballistic evidence and analysis to help solve criminal cases and support legal outcomes.

# **Course outcomes for B.Sc. Forensic Sciences MINOR- Fingerprint Analysis & Handwriting Examination**

Sr. No.	Course Outcome	Description
1	Understand the Basics of Fingerprint Analysis	Define fingerprint analysis and explain its role in forensic investigations, including the uniqueness of fingerprints and their use in criminal identification.
2	Study Different Types of Fingerprint Patterns	Learn about the different types of fingerprint patterns (loops, whorls, arches) and their classification for identification purposes in forensic investigations.



Sr. No.	Course Outcome	Description
3	Explore Fingerprint Collection and Preservation Techniques	Understand the methods used to collect, preserve, and analyze fingerprints from crime scenes, including lifting latent prints and using chemical or physical techniques.
4	Investigate Fingerprint Matching and Comparison Methods	Learn the process of comparing fingerprints, using both traditional manual methods and modern automated fingerprint identification systems (AFIS).
5	Understand the Role of Fingerprints in Criminal Investigations	Study how fingerprint evidence is used to link suspects to crime scenes and how it plays a critical role in solving criminal cases, such as burglaries, homicides, and thefts.
6	Learn the Fundamentals of Handwriting Examination	Explore the process of handwriting analysis, including the identification of writing styles, signatures, and forgeries to determine the authenticity of documents.
7	Investigate the Characteristics of Handwriting and Its Forensic Significance	Study the unique features of handwriting (e.g., slant, pressure, size) and their use in criminal investigations, particularly in cases involving forged documents.
8	Apply Fingerprint and Handwriting Analysis to Real- World Cases	Analyze case studies to apply fingerprint analysis and handwriting examination techniques in solving real-world criminal cases, ensuring proper collection, comparison, and legal compliance.
9	Understand the Legal and Ethical Considerations in Forensic Analysis	Explore the ethical and legal issues in fingerprint and handwriting analysis, including privacy concerns, the admissibility of evidence, and the role of experts in court.

## **Program Details**

- Duration:4Years (8 Semesters)
- **Total Credits: 160–180 credits**
- Total Teaching & Training Hours: 6,000–6,500 hours
- Mode: Classroom, Laboratory, Clinical Training, and Internship
- Assessment: Continuous Internal Assessment (CIA), Semester-End Examinations, Practical Examinations, Clinical Case Presentations, and Research Project
- > Internship & Research: One-Year Clinical Internship (Final Year)

### **Total Hours Distribution**

- **Theory Classes** 2,500–2,800 hours
- > Practical & Laboratory Training 1,500–1,800 hours
- Clinical Training & Internship 1,000–1,200 hours
- Research & Dissertation 300–500 hours



## **Assessment Methods**

Assessment Component	Weightage (%)	Details
Continuous Internal Assessment (CIA)	40%	Includes internal exams, assignments, presentations, case studies, and practical performance
End-Semester Examination (ESE)	60%	Divided into theory (40%) and practical (20%)
Mid-Semester Exams	20% (Part of CIA)	Two internal tests per semester
Assignments & Case Studies	<b>5%</b> (Part of CIA)	Research-based assignments, patient case studies, and literature reviews
Seminars & Presentations	<b>5%</b> (Part of CIA)	Oral/poster presentations on diabetes management and treatment approaches
Practical Performance & Clinical Evaluation	<b>5%</b> (Part of CIA)	Skill-based assessments in diabetic labs and clinical settings
Attendance & Participation	<b>5%</b> (Part of CIA)	Regularity in theory & practical sessions
Theory Examination (Final)	<b>40%</b> (Part of ESE)	Structured written paper covering subject knowledge
Practical Examination (Final)	<b>20%</b> (Part of ESE)	Includes viva, skill demonstration, and clinical diabetes case handling
Dissertation/Research Project (Final Year)	Mandatory	Evaluated in the final year by internal & external examiners
Clinical Internship/Training in Diabetes Care Centers	Pass/Fail	Logbook-based evaluation with mentor review

# Marking System & Grading

Marks (%)	Grade	Grade Point (GPA/CGPA Equivalent)	Classification
90 - 100	O (Outstanding)	10	First Class with Distinction
80 - 89	A+ (Excellent)	9	First Class with Distinction
70 - 79	A (Very Good)	8	First Class



Marks (%)	Grade	Grade Point (GPA/CGPA Equivalent)	Classification
60 - 69	B+ (Good)	7	First Class
50 - 59	B (Satisfactory)	6	Second Class
<50 (Fail)	F (Fail)	0	Fail (Re-exam Required)

#### **Pass Criteria:**

- > Minimum 50% marks in each subject (Theory & Practical separately).
- > Aggregate of 55% required for progression to the next semester.
- > No more than two backlogs allowed for promotion to the final year.

## Exam Pattern for Theory & Practical

## A. Theory Examination Pattern

#### Total Marks: 100 (Converted to 40% for End-Semester Assessment) Duration: 3 Hours

Section	Question Type	No. of Questions	Marks per Question	Total Marks
Section A	Short Answer Type (SAQ)	10 (Attempt all)	2	20
Section B	Long Answer Type (LAQ)	5 (Attempt any 4)	10	40
Section C	Case-Based/Clinical Scenarios	3 (Attempt any 2)	15	30
Section D	MCQs/Obje <mark>ctive T</mark> ype	10 (Compulsory)	1	10
Total				100

## Weightage:

- Forensic Biology & DNA Analysis 30%
- Criminalistics & Crime Scene Investigation 30%
- > Toxicology & Forensic Chemistry 20%
- ▶ Digital Forensics & Cybercrime 10%
- ► Research & Legal Aspects 10%

### Passing Criteria: Minimum 50% (50/100 marks)

## **B.** Practical Examination Pattern



**Total Marks:** 100 (Converted to 20% for End-Semester Assessment) **Duration:** 4–6 Hours

Component	Marks Distribution
Crime Scene Investigation & Evidence Analysis	30
OSCE (Objective Structured Clinical Examination) – Skill Demonstration	25
Toxicological & Chemical Analysis	20
Lab-Based Examination (Fingerprint Analysis, DNA Profiling, Drug & Poison Detection)	15
Record Work (Logbook & Assignments)	10
Total	100

## **OSCE** (Skill-based Assessment) includes stations on:

- Fingerprint Identification & Comparison
- Blood & Biological Fluid Analysis (Serology, DNA Extraction)
- Drug & Poison Detection in Biological Samples (Chromatography, Spectroscopy)
- Crime Scene Documentation & Evidence Collection Procedures

Passing Criteria: Minimum 50% (50/100 marks) in practicals.

Recommended Books & E-Resources

## Textbooks

- "Criminalistics: An Introduction to Forensic Science" Richard Saferstein
- "Forensic Toxicology: Principles and Applications" Nicholas T. Lappas
- "Introduction to Forensic Psychology" Curt R. Bartol
- "Fundamentals of Forensic Science" Max M. Houck

## **E-Resources & Journals**

- American Academy of Forensic Sciences (AAFS) <u>www.aafs.org</u>
- > Journal of Forensic Sciences (JFS)
- Forensic Science International Journal
- > Interpol Forensic Science Guidelines

## **Career Opportunities after B.Sc. in Forensic Sciences & Toxicology**

- > Forensic Scientist in Government & Private Labs
- Crime Scene Investigator (CSI)
- > Toxicologist in Medical & Pharmaceutical Industries
- Cybercrime & Digital Forensics Analyst



Legal Consultant for Forensic Investigations

