

Forensic investigation and legal framework in india**Dr. Sunita Rawat¹**¹Department of Zoology, S.B.B.G.P.G.College, Harakh, Barabanki, Uttar Pradesh

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Abstract

Forensic investigation has evolved as a crucial means in criminal proceedings around the world. There is a wide range of evidence recovered from the crime scene that can be analysed and presented in court. Crime related to electronic devices, cyber fraud, neglect, or murder can be solved with the help of forensic investigation. Expert analysis is required to identify and assess forensic evidence and reveal the truth. Various forensic investigating agencies and laws are established in India to ensure effective application of this evidence in the justice system. This article focuses on the various fields covered under forensics, the development of forensic science agencies, and the legal framework in India.

Keywords: *Forensic Science, Institutes, Criminal Investigation, Legal framework, India.*

Introduction

Forensic Science comprises the scientific perspective and methods to solve criminal investigations. It includes biological procedures, DNA profiling and toxicological analysis, ballistics, and electronic devices-related trials like cyber forensics. Forensic fingerprint analysis combines traditional techniques and modern technology in criminal investigations. Experts are required to collect evidence from the crime scene and derive real information. Forensics is a wide field that comprises various branches. Major branches of Forensic Science Include-

Digital Forensics involves subfields like Cyber forensics, Mobile forensics, and Computer forensics, which employ the applications of computer science and electronic devices.

Deepfake Forensics covers the cases related to AI-generated synthetic media. Deepfakes are capable of producing fictitious content that looks highly realistic. It has emerged as a huge challenge across various subfields, like cybersecurity, digital communication, and entertainment. Deep learning techniques are being used to detect deepfake images and videos for forensic analysis.

Environmental Forensics involves the use of environmental data for civil and criminal proceedings. Environmental samples are analysed in a laboratory or with Computer modelling and then correlated for contamination and pollution.

Forensic Anthropology focuses on the identification of human beings by examining skeletal remains. Forensic anthropologists try to identify the victim or deceased person's age, height, gender, race, etc. by recovering and investigating human remains found on the spot. Forensic Osteology and Forensic Taphonomy are the subfields of this branch of Forensic Science.

Forensic Ballistics experts investigate evidence like firearms and bullets found on the crime scene.

Forensic Document Examination: Any document found on the crime spot could be important as evidence. Forensic experts examine and correlate these in the investigation process. Handwriting and signature analysis also prove as strong evidence.

Forensic Fingerprint analysis falls under the category of Dactyloscopy.

Forensic Podiatry includes the examination of Footprints and Shoeprints found on the crime scene. It helps determine the Gender and age-like features of the questioned person.

Forensic Biology employs biological methods to investigate criminal matters. The field may be subdivided into Forensic DNA Analysis, Forensic Serology, and Forensic Entomology. **Forensic DNA Analysis** studies and matches DNA fragments with the victim or suspect of a crime to solve criminal offences. DNA analysis is also helpful in Paternity and relationship-related issues.

Forensic Serology investigates body fluids using biological tests. E.g., blood or saliva found at the crime scene may be used as evidence.

Forensic Toxicology examines the presence of toxins, alcohol, or drugs, etc in the victim's body.

Forensic Odontology is concerned with the examination of teeth structure and alignment to identify a person and age in legal proceedings.

Forensic Radiology employs radiological examinations using Ultrasound, X-ray, Computed Tomography (CT) Scans, Magnetic Resonance Imaging (MRI), etc. It is referred to as Virtual Autopsy when performed on Dead bodies for forensic investigations.

Forensic Entomology involves the identification of insects and their life cycle stages found on the crime scene, and is used for Post Mortem Interval estimation. It may also provide cues in cases of abuse and neglect. Primary and secondary crime spots can also be determined using insect evidence.

Wildlife Forensics deals with cases of wildlife and endangered animals. Investigation of the deaths of animals in forests or protected areas and poaching cases are considered.

Forensic Entomotoxicology is a related subfield in which insects are tested for the ingredients they fed on the decaying cadaver. When the body is found in a late stage of decomposition, and routine toxicological or serological tests are not possible, insects are collected from the cadaver and surrounding areas and can be tested for toxicological analysis.

THE FORENSIC SCIENCE INSTITUTES IN INDIA-

Various Central, State and Private Universities in India are currently offering numerous programmes on Forensics. Some of the key institutions are-

National Forensic Science University (NFSU)-

Gujarat Forensic Sciences University (GFSU), established in 2009, was the first university in the world that is dedicated to forensic and investigative sciences. It paved the foundation of National Forensic Science University. GFSU was upgraded to the National Forensic Science University by an Act of Parliament in 2020. The headquarters of NFSU is situated at Gandhinagar, Gujarat. Various campuses of NFSU are established nationwide, including Delhi, Dharwad, Nagpur, Raipur, Bhopal, Pune, Jaipur, Goa, Tripura, Guwahati, Manipur, Chennai, Varanasi and Bhubaneswar. It became an international university when its first campus was established in Uganda.

NFSU works with the Ministry of Home Affairs, fostering research and applied applications in forensic science, law, legal studies, criminology, applied behavioural science study, and other allied fields. It provides training to develop awareness and aptitude towards research and skill development in forensics.

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The University assists the Central Government, State Governments and Union territory Administrations in the formulation of forensic-related policies and laws. NFSU aims to form and update a national forensic database for criminal investigation, including fingerprints, voice, DNA records, firearms, Narcotic drugs, and Cybersecurity. Delhi campus of NFSU was formerly known as Lok Nayak Jayprakash Narayan National Institute of Criminology and Forensic Science. National Forensic Science University, Dharwad, Karnataka is the first in South India.

Dr. Harisingh Gour Vishwavidyalaya, Sagar, Madhya Pradesh. Department of Criminology and Forensic Science was established in 1959 in the Vishwavidyalaya. It is one of the oldest and pioneer institutes of Forensic Science in India.

Various State Universities also run Programs on Forensic Science and Allied fields-

Panjab University, Chandigarh, The Institute of Forensic Science and Criminology (IFSC) was established in 2009-10. Later, in 2026, it was renamed as the Department of Forensic Science.

Punjabi University, Patiala, started a Forensic Science section within the Department of Chemistry in 1974 and later, in 1989, an independent department. It was the first Forensic Science department in Northern India and the second oldest in the country. The University offers the research in Forensic Biology, Serology, DNA Forensics, Toxicology, Forensic Chemistry, Fingerprint Examination, and Questioned Documents.

Karnataka University in Dharwad, Karnataka, possesses a Department of Criminology and Forensic Science. It was established in 1969 and provide comprehensive facility of professional education, training, research, and consultancy etc. The major thrust areas of research are related to Police, Investigation, Prison, Judicial, Cyber Crimes, etc.

Osmania University: The Forensic Science program was started with Department of Chemistry. Osmania University, Hyderabad, Telangana, in 2000-2001 with the support from the Andhra Pradesh State Forensic Science Laboratory. In 2006, the course in the Department of Forensic Science, Ministry of Home Affairs, Government of India was supported by Osmania University.

Dr. APJ Abdul Kalam Institute of Forensic Science and Criminology, Bundelkhand University, Jhansi. The institute provides advanced Laboratory facilities, field-based training, and active collaboration with the Regional Forensic Science Laboratory and enforcement agencies in Uttar Pradesh.

The Institute of Forensic Science, University of Mumbai, established in 2009 by the Department of Higher & Technical Education, Government of Maharashtra. It is a constituent College of Dr. Homi Bhabha State University, Mumbai, and offers various programs in forensics.

Forensic Science Programs in Uttar Pradesh-

Uttar Pradesh State Institute of Forensic Science (UPSIFS), Lucknow, affiliated to the National Forensic Science University, Gandhinagar, is established by the Government of Uttar Pradesh. UPSIFS was inaugurated in March 2024. The Institute provides education and research in conventional and advanced fields such as Digital Forensics, Mobile Forensics, Multimedia Forensics, Deepfake Forensics, Drone Forensics, Financial Forensics, Dark Web. Cyber Laws and Global Investigations in Forensics are also fields of interest from an Indian perspective.

University of Lucknow- Department of Anthropology hosts the Forensic Science programme since 1951. M.A./ M.Sc. programme in Forensic Science was added in 2015. The Department provides knowledge on forensic biology, anthropology, forensic toxicology, forensic chemistry, statistics, etc.

Banaras Hindu University- The Centre of Forensic Science was established in the main campus of Banaras Hindu University in. It provides courses, training, and research in various fields of forensic sciences.

Aligarh Muslim University is situated in Uttar Pradesh. The Department of Forensic Medicine was established in 1966 at the Jawaharlal Nehru Medical College. It provides courses in Forensic medicine, Cyber forensics, and Digital forensics, etc.

LEGAL FOUNDATION OF FORENSICS IN INDIA-

Indian legal system has various provisions and Laws governing the application of forensic science in criminal investigations. Some key provisions are-

- **The Bhartiya Sakshya Adhiniyam, 2023-** Repealing the Indian Evidence Act, 1872

Forensic specialists are recognised as “experts” on matters involving science or art under section 39. Courts can order any person to provide handwriting or signature specimens, often analysed using forensic methods under section 72.

Under Section 39(1) expert testimony is admissible in court, and forensic experts can provide critical insights in areas like DNA analysis, fingerprint identification, and toxicology.

- **The Bharatiya Nagarik Suraksha Sanhita, 2023 (BNSS)-** Repealing the Code of Criminal Procedure, 1973 (CrPC). The BNSS retains most of the provisions of the CrPC. It allows acceptance of forensic experts' reports in criminal investigation without the need for the expert to be present in court unless the court orders (Section 329).

The Section 51,52 and 53 includes examinations like the examination of blood, blood stains, semen, swabs in case of sexual offences, sputum and sweat, hair samples and finger nail clippings by the use of modern and scientific techniques including DNA profiling and such other tests which the registered medical practitioner thinks necessary in a particular case.

The Key changes proposed include:

Forensic investigation: The BNSS Bill directs forensic investigation in crimes punishable with at least seven years' imprisonment. The bill mandates that in such cases, forensic experts will visit crime scenes to collect evidence and record the process on a mobile phone or any electronic device. If a state does not have a forensic facility, it shall utilise this facility in another state (section 176).

Finger impressions and voice samples: While the old CrPC only Finger impressions and voice samples are also included in the bill BNSS. It allows these samples to be collected from a person who has not been arrested (section 349).

- **Narcotic Drugs and Psychotropic Substances Act, 1985 (NDPS Act)**

This Act allows the forensic testing of seized substances for narcotics and psychotropic elements.

- **Information Technology Act, 2000**

This Act governs cybercrimes and electronic evidence. Mandates for certified forensic labs for validation of electronic evidence.

CONCLUSION-

Forensic Science has become an indispensable tool to solve criminal offences. It encompasses a wide range from electronic devices to biological analysis. Specialists of every sub-field are required for the identification, analysis, and interpretation of forensic evidence. For this purpose, various forensic labs and government and private forensic Universities have been established in India. Legal provisions related to the admissibility of forensic evidence in the justice system are being established. Improvements in forensic Science training programmes and strict enforcement of the law can provide firm support in the justice system.

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