Department of Criminology & Forensic Science

School of Applied Sciences

Curriculum Framework

of

Bachelor of Science

Based on National Education Policy- 2020

Date of BoS: September 17, 2022

Doctor Harisingh Gour Vishwavidyalaya
(A Central University)
Sagar-Madhya Pradesh-470003

About the Department

In 1950, UNESCO realized the significance of the teaching of criminal justice at the college and university levels in Asia, and in 1955, a consensus emerged at a symposium held in London. University of Saugor (Sagar) responded to that consensus first and as a result, the Department of Criminology & Forensic Science was established on 18th July 1959 largely due to the initiative taken by Shri D. P. Mishra, (the then Vice Chancellor, 1956-1962, and later Chief Minister of Madhya Pradesh). The former Chief Justice of the Madhya Pradesh High Court, Justice G. P. Bhatt, was appointed as its first regular Professor and Head of the Department.

The Department of Criminology and Forensic Science is running two different courses under the School of Applied Sciences. The department is involved in teaching Criminology and Forensic Science at the graduate and postgraduate levels, leading to B.A./M.A. in Criminology and B.Sc./M.Sc. in Forensic Science degrees, respectively, along with research facilities for Ph.D. in both the disciplines. The department is recognized as a DST-FIST-sponsored department. The contributions of the department are varied and remarkable in teaching and research. The alumni of the department are currently occupying outstanding positions and are globally known for their achievements.

Curriculum Framework based on National Education Policy-2020

NEP-2020 has conceptualized the idea to develop well rounded competent individuals to make the nation a self-reliant and global leader. In the same spirit, we at the Department of Criminology and Forensic Science have developed a curriculum framework to encompass the goals of NEP 2020. To this end, we have incorporated choice of subject/disciplines of study,creating academic pathways having constructive combinations of disciplines for study with multiple entry and exit points, as well as focusing on **experiential learning** for students by introducing **multidisciplinary and skill enhancement courses** and actual Hands on training in the recent and trending aspects of the area of concern.

Undergraduate Curriculum Framework for Bachelor of Science

1. **Name of the Programme :** B.Sc. Forensic Science

2. **About the Programme:**
   B.Sc. – Forensic Science is a 6 Semester (3 years) undergraduate program providing knowledge and developing skills in the disciplines of Forensic Sciences. This UG program shall have a “Choice Based Credit System” (CBCS). There shall be a total of 6 Multi Disciplinary Major (MDM) of 4 credits each; and a total of 6 Multidisciplinary Major practicals of 2 credits each. In addition, there would be a total of 6 Discipline Specific Major (DSM) of 4 credits each; and a total of 6 Discipline Specific Major (DSM) practicals of 2 credits each; There shall be a total of 6 skill enhancement courses

(SEC) of 2 credits each. In addition, there shall be 6 Ability Enhancement Courses (AEC) of 2 credits each in each semester respectively.

3. Objectives of the Programme

After completing the course, the students will have comprehensive fundamental knowledge about:

1. Principle, scope, ethics in Forensic Science.
2. Physical evidence including forensic ballistics, medicine and jurisprudence.
3. General and emerging trends in forensic chemistry, forensic toxicology, forensic biology, questioned document examination, etc., along with instrumental analysis.
4. Ideas about popular techniques like voice analysis, spectroscopy, chromatography, etc.,

4. Programme Learning Outcomes :

The programme learning outcomes are attained by learners through the essential learning acquired on completion of selected courses of study within a programme. The outcomes and attributes described in qualification descriptors are attained by students through learning acquired on completion of a programme of study:

a. The basic concept of forensic science and the organizational setup of forensic science laboratories in India.

b. Methods of securing, searching, and documenting the scene of crime.

c. The significance of physical (including forensic ballistics), toxicological, and biological evidence in criminal investigation.

d. The preliminary examination of arson, toxicological, blood and vitriolage related exhibits.

e. The significance of the questioned document and fingerprint examination.

5. Structure of the Programme

Level: 5 Semester I			
Nature of Course	**Course Code**	**Course Title**	**Credits**
Discipline Specific Major-1	**FSC-DSM-111**	**The Basics of Forensic Science & Criminalistics: Theory**	**4**

	FSC-DSM-112	**The Basics of Forensic Science & Criminalistics: Practical**	**2**
Multi-Disciplinary Major-2	**FSC-MDM-111**	**Introduction to Forensic Biology: Theory**	**4**
	FSC-MDM-112	**Introduction to Forensic Biology: Practical**	**2**
Skill Enhancement Course (SEC)	**FSC-SEC-111**	**Crime Scene Management.**	**2**
Ability Enhancement Course (AEC)	**FSC-AEC-111**	**The Basics of Questioned Documents**	**2**

Semester II			
Nature of Course	**Course Code**	**Course Title**	**Credits**
Discipline Specific Major-1	**FSC-DSM-211**	**Police Science & Criminal Justice System: Theory**	**4**
	FSC-DSM-212	**Police Science & Criminal Justice System: Practical**	**2**
Multi-Disciplinary Major-2	**FSC-MDM-211**	**Instrumental Techniques in Forensic Science: Theory**	**4**
	FSC-MDM-212	**Instrumental Techniques in Forensic Science: Practical**	**2**
Skill Enhancement Course (SEC)	**FSC-SEC-211**	**The Basics of Fingerprints**	**2**
Ability Enhancement Course (AEC)	**FSC-AEC-211**	**Introduction to DNA fingerprinting-I**	**2**

6. Exit: Certificate in Forensic Science

7. Teaching Learning Approach:

This programme will mainly transact the under given pedagogic approach-

a. Lecture/ Seminar

b. Demonstration
c. Readings/written assignments and field projects
d. Group discussions/tutorial
e. Community visit
f. Project work
g. Field Visit/Survey/Dissertation

8. Assessment

The learners in the programme will be assessed throughout the duration of the programme in formative and summative evaluations, i.e., Mid (I&II) and end semester examinations. To be eligible to appear in End semester examination a student must appear in Mid semester examinations along with 75 per cent attendance in classroom processes.

Semester I

FSC-DSM-111- Basics of Forensic Science & Criminalistics: Theory								
Level / Semester	Course Code	Title of the Course	Credit				Marks	Course Coordinator
			L	T	P	C		
L5 Sem I	FSC-DSM-111	The Basics of Forensic Science & Criminalistics	4	0	0	4	IA(Mid)-40 EA(End Sem)- 60	

Lectures/hrs. 60

1. **Learning Objectives:**
   To enhance the skill in fundamentals of forensic science, the importance of different types of evidence found at a crime scene and their examination to solve a crime.
2. **Course Learning Outcomes :**
   Understanding the fundamentals of forensic science, which includes crime scene management, importance of various physical, biological, and toxicological evidence.

Unit-I: Forensic Science **15 hrs**

History, Development at the National and International Level, Basic Principles of Forensic Science and its Significance, The Need for Forensic Science, Nature and Scope of Forensic Science, Educational Bodies in India and Other Nations, Organizational Structure of Forensic Science Laboratories in India, Ethics in Forensic Science, Frye Case and Daubert Standard.

Unit-II: Criminalistics **15 hrs**

Definition, What is A Crime Scene, Types of Crime Scene, Crime Scene Management-Technology Management, Logistic Management, Manpower Management, Crime Scene Search Methods, Duties of First Responders at Crime Scene, Coordination between Police Personals and Forensic Scientists at Crime Scene.

Unit-III: Physical Evidences **10 hrs**

Definition, Classification of Physical Evidences- on the Basis of Class, Nature and Size, Different Search Methods for Physical Evidences, Collection, Preservation, Packaging, Labelling, Sealing and Forwarding of Physical Evidences, Chain of Custody.

Unit-IV: Introduction & Examination of **10 hrs**

a) Soil & Paint, b) Glass, Tool marks, c) Skid marks, d) Digital evidence, e) Cement, f) Mortar & Concrete, g) Explosive and h) Arson Evidence etc.

Unit-V: Introduction and Examination of **10 hrs**

Biological and Toxicological Evidence such as Blood, Semen, Saliva, Vomit, Tears, Nails, Viscera, Hair & Fibre.

Essential Reading:

1. James S. H. (2014). Forensic Science: An Introduction to Scientific and Investigative Techniques. New York, Taylor & Francis.

2. Saferstein R. (1995). Criminalistics – An Introduction to Forensic Science. USA, Prentice Hall Inc.

3. Sharma B.R. (2003). Forensic Science in Criminal Investigation and Trials. India, Universal Law House.

4. Sharma J. D., (1988). Vidhivigyan Avem Vish Vigyan. India,Madhya Pradesh Hindi Granth Academy.

5. Sharma J. D. (2011). Apradhon ka Vigyanik Anveshan. India,Madhya Pradesh Hindi Granth Academy.

Suggested Readings:

1. Aitken C.G.G., & Stoney, D.A. (1991). The Use of Statistics in Forensic Science. England, Ellis Harwood Limited.

2. Bowen R.T. (2016). Ethics and the Practice of Forensic Science. New York, CRC Press.

3. De F. & P. R.(1983). Forensic Science- An Introduction to Criminalistics. New York, McGraw-Hill.

4. Horswell J.(2016). The Practice of Crime Scene Investigation. New York, CRC Press.

5. Nordby, James, S.H. & J.J. (2003). Forensic Science: An Introduction to Scientific and Investigative Techniques. USA, CRC Press.6. O'Hara & Osterberg, (1949). An Introduction to Criminalistics. New York, The Macmillan Company.

7. Siegel J. A. & Mirakovits K.(2006). Forensic Science: The Basics. New York, CRC Press.

FSC-DSM-112- The Basics of Forensic Science & Criminalistics: Practical								
Level Or Semester	Course Code	Title of the Course	Credit				Marks	Course Coordinator
			L	T	P	C		
L5 Sem I	FSC-DSM- 112	The Basics of Forensic Science & Criminalistics: Practical	0	0	2	2	IA(Mid)-40 EA(End Sem)-60	

1. **Learning Objectives:**

   To have practical knowledge about the basic steps of crime scene investigation and preliminary examinations of different evidence.

2. **Course Learning Outcomes :**

   Understanding about the collection, packing, labelling, and forwarding of different physical evidence to forensic science laboratories; basic crime scene investigation steps; preliminary examination of arson, toxicological, blood, and vitriolage related exhibits.

List of Practical **60 hrs**

1. Collection, Packing, Labelling, and Forwarding of the Following Physical Evidence: (A) Biological Fluids (B) Soil/Dust (C) Wet Exhibits (D) Hair/ Fibre (E) Glass Material (F) Liquids (G) Pharmaceutical Products/Drugs of Abuse (H) Botanical Material.
2. To Know the Basic Steps of Crime Scene Management Followed by an Investigator
3. Preliminary Examination of Arson Evidences
4. Preliminary Examination of Toxicological Evidence
5. Preliminary Examination of Blood Stains Found on Different Surfaces Like Walls, Glass, Clothes, Soil, etc.
6. Preliminary Examination of Evidence Found in the Case of Vitriolage.

Essential Reading:

1. James S. H. (2014). Forensic Science: An Introduction to Scientific and Investigative Techniques. New York, Taylor & Francis.

2. Saferstein R. (1995). Criminalistics – An Introduction to Forensic Science. USA, Prentice Hall Inc.

3. Sharma B.R. (2003). Forensic Science in Criminal Investigation and Trials. India, Universal Law House.

4. Sharma J. D., (1988). Vidhivigyan Avem Vish Vigyan. India,Madhya Pradesh Hindi Granth Academy.

5. Sharma J. D. (2011). Apradhon ka Vigyanik Anveshan. India,Madhya Pradesh Hindi Granth Academy.

Suggested Readings:

1. Aitken C.G.G., & Stoney D.A. (1991). The Use of Statistics in Forensic Science. England, Ellis Harwood Limited.

2. Bowen R.T. (2016). Ethics and the Practice of Forensic Science. New York, CRC Press.

3. De F. & P. R.(1983). Forensic Science- An Introduction to Criminalistics. New York, McGraw-Hill.

4. Horswell J.(2016). The Practice of Crime Scene Investigation. New York, CRC Press.

5. Nordby, James, S.H. & J.J. (2003). Forensic Science: An Introduction to Scientific and Investigative Techniques. USA, CRC Press.6. O'Hara & Osterberg, (1949). An Introduction to Criminalistics. New York, The Macmillan Company.

7. Siegel J. A. & Mirakovits K.(2006). Forensic Science: The Basics. New York, CRC Press.

FSC-MDM-111- Introduction to Forensic Biology: Theory								
Level Or Semester	Course Code	Title of the Course	Credit				Marks	Course Coordinator
			L	T	P	C		
L5 Sem I	FSC-MDM-111	Introduction to Forensic Biology: Theory	4	0	0	4	IA(Mid)-40 EA(End Sem)- 60	

1. **Learning Objectives:**

   To understand basic concepts of forensic biology and the analysis of forensic exhibits.

2. **Course Learning Outcomes :**

   understanding of the nature and importance of cells in the human body and different biological materials and their examination.

Unit-I: Collection of biological evidence **12 hrs**

Packaging, forwarding and collection of biological and serological evidence. Cases study in relation to rape, death, hanging, arson, drowning cases

Unit-II: Typing of Blood Groups **12 hrs**

Introduction, Classification, Agglutination techniques involved in analyzing A, B, AB, O, Rh+ and Oh blood types.

Unit-III: Forensic Botany **12 hrs**

Forensic Botany: Introduction, Nature & Scope, Woods & their Identification and Matching, Diatoms and their Forensic Significance in Drowning Cases, Study and Identification of Pollen Grains.

Unit-IV: Identification and Examination of Biological Fluids and Body Remains **12 hrs**

Blood, Semen, Saliva, Urine, Feces, etc., Bone: Estimation of Height, Age, and Sex, Facial Reconstruction. Hair: Hair Anatomy and Examination of Hairs of Animal and Human Origin.

Unit-V: DNA Profiling **12 hrs**

Structure of DNA, Damage to DNA, Variation in DNA, DNA as Excellent Polymorphic Marker, Basis of DNA Typing and Techniques.

Essential Readings:

1. James S.H. & Nordby J.J. (2003).Forensic Science: An Introduction to Scientific and Investigative Techniques. USA, CRC Press.

2. O' Hara & Osterberg (1949). An Introduction to Criminalistics. USA, The Macmillan Company.
3. Saferstein R. (1995). Criminalistics - An Introduction to Forensic Science. USA, Prentice hall Inc.
4. Sharma B. K.(2000). Instrumental Methods of Chemical Analysis. India,Krishna Prakashan Media.
5. Stuart H.J. Nordby J.J. & Suzanne B. (2005). Forensic Science: An Introduction to Scientific and Investigative Techniques. USA, Tayler and Francis.

Suggested Readings:

1. Huffman J.E. & Wallace, J.R. (2012). Wildlife Forensics: Methods and Applications. USA, John Wiley & Sons.
2. Jorg T. & Lubjumhin E.T. (1995). DNA Profiling and DNA Fingerprinting. Basel, Birkhauser Verlag.
3. Liu, T. X., & Kang, L. (2011). Recent Advances in Entomological Research: From Molecular Biology to Pest Management. Germany, Springer Science & Business Media.
4. Nordby J. (2000). Dead Reckoning – The Art of Forensic Science Detection. USA, CRC Press LLC.
5. Shewale, J.G., and Liu, R. H. (2016). Forensic DNA Analysis: Current Practices and Emerging Technologies.USA, CRC Press.

FSC-MDM-112- Introduction to Forensic Biology: Practical								
Level Or Semester	Course Code	Title of the Course	Credits				Marks	Course Coordinator
			L	T	P	C		
L5 Sem I	FSC-MDM- 112	Introduction to Forensic Biology: Practical	0	0	2	2	IA(Mid)-40 EA(End Sem)- 60	

1. **Learning Objectives:**

   To have practical knowledge about blood and blood groups, saliva, hair, fibres, and pollen.

2. **Course Learning Outcomes :**

   Understanding about Blood/ blood group examination, origin of species by hair samples, identification of fibres by physical and chemical methods, microscopic examination of pollen and diatoms.

List of Practical **60 hrs**

1. Examination of Blood through Confirmatory Test.
2. Determination of Blood group from Exhibits.
3. Preliminary Examination of Salivary Stains.
4. Determination of Origin of Species by Hair Samples.
5. Identification of Fibers by Physical and Chemical Methods.
6. Mounting of Pollens and their Microscopic Examination.

Essential Readings:

1. James, S.H., and Nordby, J.J. (2003). Forensic Science: An Introduction to Scientific and Investigative Techniques. USA, CRC Press.
2. O' Hara & Osterberg (1949). An Introduction to Criminalistics. USA, The Macmillan Company.
3. Saferstein R. (1995). Criminalistics - An Introduction to Forensic Science. USA, Prentice hall Inc.
4. Sharma B. K.(2000). Instrumental Methods of Chemical Analysis. India,Krishna Prakashan Media.

5. Stuart H.J., Nordby J.J., and Suzanne B. (2005). Forensic Science: An Introduction to Scientific and Investigative Techniques. USA, Tayler and Francis.

Suggested Readings:

1. Huffman J.E. & Wallace, J.R. (2012). Wildlife Forensics: Methods and Applications. USA, John Wiley & Sons.
2. Jorg T. & Lubjumhin E.T. (1995). DNA Profiling and DNA Fingerprinting. Basel, Birkhauser Verlag.
3. Liu, T. X., & Kang L. (2011). Recent Advances in Entomological Research: From Molecular Biology to Pest Management. Germany, Springer Science & Business Media.
4. Nordby J. (2000). Dead Reckoning – The Art of Forensic Science Detection. USA, CRC Press LLC.
5. Shewale, J.G., and Liu, R. H. (2016). Forensic DNA Analysis: Current Practices and Emerging Technologies.USA, CRC Press.

FSC-SEC-111 : Crime Scene Management								
Level/ Semester	Course Code	Title of the Course	Credits				Marks	Course Coordinator
			L	T	P	C		
L5 Sem I	FSC-SEC-111	Crime Scene Management: Theory	2	0	0	2	IA(Mid)-40 EA(End Sem)- 60	

1. **Learning Objectives:**

   To enhance the skills in complete management of crime scenes like documentation, collection of and preservation of evidence, different searching methods of evidence and the role played by the investigating officer during crime scene management.

2. **Course Learning Outcomes :**

   Understanding about crime scene investigation and its management, legal procedures to make decisions related to investigative techniques, analysis of evidence, and courtroom testimony, develop ability to conduct interviews and interrogations.

Unit-I: Crime Scene Management **6 hrs**

Introduction to Crime Scene, Definition of Crime Classifications of Crime Scenes, Primary and Secondary, Indoor, Outdoor and Mobile, Macroscopic and Microscopic, other Specific type of Crime Scene, other specific type of crime scene.

Unit-II: Crime Scene Procedure -I **6 hrs**

Role of the First Responding Officer (First Officer at the Scene, Recording the Time, Assisting the Victim, Search for and Apprehension of Accused, Securing the Crime Scene), Initial Crime Scene Response, Crime Scene Communication. Securing and Isolating the Crime Scene.

Unit-III: Crime Scene Procedure -II **6 hrs**

Role of Forensic Scientist at Scene of Crime, Identification of Physical Evidence in Criminal Investigation, Assisting Investigating Officer in Crime Scene Management, Legal Implications for Crime Scene Searches.

Unit-IV: Crime Scene Documentation **6 hrs**

Plan of Action, Note Taking, Crime Scene Search, Crime Scene Photography, Types of Cameras, Types of Media, Number of Photographs, Admissibility of Photographs, Videography of the Crime Scene.

Unit-V: Sketching of Scene of Crime **6 hrs**

Importance of Sketching of Scene of Crime, Essential Ingredients for Sketching of Scene of

Crime, Locating Objects in the Sketch, Procedure of Sketching an Indoor Scene of Crime, Procedure of Sketching an Outdoor Scene of Crime, Admissibility of Sketches, Comparison of Sketching and Photography.

Essential Readings:

1. Aitken, C.G.G., and Stoney, D.A. (1991). The Use of Statistics in Forensic Science. England, Ellis Harwood Limited.
2. Horswell J. (2016).The Practice of Crime Scene Investigation. USA,CRC Press.
3. James S.H. (2014). Forensic Science: An Introduction to Scientific and Investigative Techniques. UK,Taylor & Francis.
4. James, S.H. and Nordby, J.J. (2003). Forensic Science: An Introduction to Scientific and Investigative Techniques. USA, CRC Press.
5. O' Hara & Osterberg (1949). An Introduction to Criminalistics. New York, The Macmillan Company.
6. Saferstein R. (1995). Criminalistics – An Introduction to Forensic Science. USA, Prentice hall Inc.
7. Sharma B. R. (2003). Forensic Science in Criminal Investigation and Trials. India, Universal Law Publishing Company.
8. Sharma J. D.(1988). Vidhivigyan Avem Vish Vigyan. India, Madhya Pradesh Hindi Granth Academy.
9. Sharma J. D. (2011). Apradhon ka Vigyanik Anveshan. India, Madhya Pradesh Hindi Granth Academy.

Suggested Reading:

1. Burke R.H. (2013).An Introduction to Criminological Theory. USA,Routledge.
2. Criminal Procedure Code 1973.
3. Indian Evidence Act 1872.
4. Indian Penal Code 1864.
5. Nordby J. (1999). Dead Reckoning – The Art of Forensic Science Detection. USA, CRC Press.
6. Unnithan N. P. (2013).Crime and Justice in India. India: SAGE Pub. India.

FSC-AEC-111- Basics of Questioned Documents								
Level/Semester	Course Code	Title of the Course	Credit				Marks	Course Coordinator
			L	T	P	C		
L5 Sem I	FSC-AEC-111	Basics of Questioned Documents: Theory	2	0	0	2	IA(Mid)-40 EA(End Sem)- 60	

1. **Learning Objectives:**
   To gain knowledge about nature & scope, tools in questioned documents, comparison of handwriting and questioned documents & forgeries.
2. **Course Learning Outcomes :**
   Understanding about collection, handling, and preservation of questioned documents, basic tools for forensic document examination; alterations in documents; charred documents; and examination.

Unit-I: Nature and Scope of Questioned Documents **6 hrs**

Definition of Questioned Document, Types of Questioned Document, Preliminary Examination of Questioned Document.

Unit II: Tools for the Examination of Questioned Documents **6 hrs**

Basic Tools Needed for Forensic Document Examination- Ultraviolet, Visible, Infrared, and Fluorescence Spectroscopy, Photomicrography, Microphotography, Visible Spectral Comparator, Electrostatic Detection Apparatus. Determining the Age and Relative Age of Documents.

Unit-III: Comparison of questioned documents-I **6 hrs**

Handwriting: Definition, Handwriting Characteristics, Class & Individual Characteristics, Comparison of Handwriting, Natural Variations, and Fundamental Divergences in Handwriting.

Unit-IV: Comparison of questioned documents-II **6 hrs**

Standards for Comparison of Handwriting; Requested standards, Collected or Admitted standards, their merits and demerits, Source for collecting admitted standards, Comparison of Paper, Ink, Printed Documents: Letterpress, lithography, Intaglio, Engraved, Typed Documents, Photocopied documents.

Unit-V: Alteration in Documents **6 hrs**

Alterations in Documents, Including Erasures, Additions, Over-Writing, and Obliterations. Indented and Invisible Writings. charred documents. Examination of Counterfeit Indian

Currency Notes, Passports, Visas, and Stamp Pads.

Essential Readings:

1. Hardless H.R. (1988). Disputed Documents, Handwriting and Thumbs- Print Identification, Profusely Illustrated. India: Low Book Co.
2. Osborn A.S. (1929): Questioned Documents
3. Hilton O. (1984): Scientific Examination of Questioned Documents, Elsevier Science Publishing co. New York
4. Kelly J.S. and Lindblom B.S. (2006): Scientific Examination of Questioned Documents, Tylor and Francis, New York
5. Harrison W.R.(1996): Suspected Documents, their Scientific Examination, Universal Book Traders
6. Ellen D (2006): The Scientific Examination of Documents, Methods and Techniques, Tylor and Francis.

Suggested Readings:

1. Nordby James, S.H. & J.J. (2003). Forensic Science: An Introduction to Scientific and Investigative Techniques. USA, CRC Press.
2. O'Hara & Osterberg (1949). An Introduction to Criminalistics. New York, The Macmillan Company.
3. Nickolls, L.C. (1956). Scientific Investigation of Crime. London, Bulterwest.

Semester II

FSC-DSM-221- Police Science & Criminal Justice System: Theory								
Level / Semester	Course Code	Title of the Course	Credit				Marks	Course Coordinator
			L	T	P	C		
L5 Sem II	FSC-DSM-221	Police Science & Criminal Justice System: Theory	4	0	0	4	IA(Mid)-40 EA(End Sem)- 60	

1. **Learning Objectives:**

   To gain knowledge about basics of forensic science in India, Police system, Criminology and Indian justice system.

2. **Course Learning Outcomes :**

   Understanding about the hierarchical set of FSLs & CFSLs, DSSB and mobile forensic unit, police forces, central institution, intelligence institutions and international perspective of forensic science, criminology and police investigation procedure, civil, criminal cases and court system with basic knowledge of fundamental rights, IPC and IEA.

Unit-I: Introduction to Forensic Science **10 hrs**

Forensic Science in India: Organizational Set up of Forensic Science Laboratories, Hierarchical Set up of CFSL, State FSL, Fingerprint Bureaus, LNJN-NICFS, Directorate of Forensic Science and Mobile Crime Laboratories. Police Services of Crime Laboratories, Duties of forensic Scientists, Code of Conduct for Forensic Scientists, Qualifications of Forensic Scientists.

Unit-II: Introduction to Police Science **10 hrs**

Ministry of Home affairs, Central Armed Police Forces - BSF, CRPF, CISF, ITBP, NSG, Assam Rifle, Special Protection Group, Central Investigation & Intelligence Institutions- CBI, IB, NIA,RAW, Narcotic Control Bureau, National Police Academy, BPR&D, NCRB- Research & Training etc. Forensic Science in International Perspectives Including INTERPOL, USA- CIA, FBI, State Police Forces- State Armed Police Forces, Home Guards, Traffic Police, CID, STF, Community Policing.

Unit-III: Introduction to Criminology **10 hrs**

Criminology: Definition & its Scope, Crime : Definition, Nature & Element of Crime, Theories of Criminal Behaviour– Biological, Sociological and Psychological. Investigation: FIR, Case

Diaries, Types of complaints, Cognizable and Non Cognizable Offences, Police Custody & Judicial Custody, Bailable and Non-Bailable Offences, Procedure of Filing Charge Sheet.

Unit-IV: Judiciary System & Indian Constitution 15 hrs

Classification – Civil & Criminal Cases, Introduction to the Labour Court, Juvenile Court etc. Constitution and Hierarchy of Criminal Courts - Organization of Courts at Block, District and State levels. The Supreme Court and high courts of India. Indian Constitution in Brief – Preamble, Fundamental Rights Art. 13, 14, 15, 19, 20, 21, 22, 32. Directive Principle of State Policy Art. 40, 44, 51 and Fundamental Duties.

Unit-V: Indian Penal Code (IPC), CrPC and Indian Evidence Act (IEA) 15 hrs

Indian Penal Code (1860) - Pertaining to Offences Against Persons, Pertaining to Offences Against Property Sections, CrPC (1873)- 26, 27, 29, 31, 144, 154-158, 176, 291, 292, 293.
IEA (1872) - Evidence and Rules of Relevancy in Brief, Expert Witness, Cross Examination and Re-examination of Witnesses, Sections.

Essential Readings:

1. Criminal Procedure Code, 1973.
2. Dennis S., (1976). Physics in the Prevention and Detection of Crime, Vo U7. US , Quantum Phys.
3. Indian Evidence Act, 1872.
4. The Indian Penal Code, 1860.
5. Nickolls L.C. (1956). Scientific Investigation of Crime. London, Bulterwest.
6. Saferstein R. (1995). Criminalistics – An Introduction to Forensic Science. USA, Prentice hall Inc.
7. Sharma B.R. (2003). Forensic Science in Criminal Investigation and Trials. India, Universal Law House.
8. Sharma J. D.(1988). Vidhivigyan Avem Vish Vigyan. India, Madhya Pradesh Hindi Granth Academy.
9. Sharma J. D. (2011). Apradh ka Vigyanik Anveshan. India, Madhya Pradesh Hindi Granth Academy.
10. Working Procedures Manual: Ballistics. (2000). India, BPR&D Pub.

Suggested Reading:

1. Brain J. H. (1997). Hand book of Firearms and Ballistics. England, John Willey.
2. Hatcher, Jury, & Weller (1977). Firearms Investigation, Identification, and Evidence. Harrisburg, Stackpole Books.

3. Johari M. (1980). Identification of Firearms, Ammunition, and Firearm Injuries. New Delhi, BPR&D.
4. Karl G. S. (1994). Wound Ballistics and the Scientific Background. London, Elsevier.
5. Vincent D. M. & P. A. (1999). Gunshot Wounds. USA, CRC Press.
6. Warlow, T. A. (1996). Firearms, the Law and Forensic Ballistics. London, Taylor and Francis.

FSC-DSM-212-Police Science & Criminal Justice System: Practical								
Level / Semester	Course Code	Title of the Course	Credit				Marks	Course Coordinator
			L	T	P	C		
L5 Sem II	FSC-DSM-222	Police Science & Criminal Justice System: Practical	0	0	2	2	IA(Mid)-40 EA(End Sem)- 60	

1. **Learning Objectives:**

   To have practical knowledge about crime scene preservation, different search methods, sketching and reconstruction of different crime scenes.

2. **Course Learning Outcomes :**

   Understanding about the crime scene preservation by sketching and photography, search methods used in outdoor, indoor and mobile crime scenes, sketching of outdoor crime scene, sketching of indoor crime scene, crime scene reconstruction methods.

List of Practical **60 hrs**

1.Preservation of the Scene of Crime by Sketching and Digital Photography

2. Sketching of the Outdoor Scene of Crime i.e. Hit & Run or Drowning.

3. Sketching of the Indoor Scene of Crime i.e. Criminal Trespass or Theft.

4. Sketching of the Indoor Scene of Crime i.e. Homicide.

5. Sketching of the Outdoor Scene of Crime i.e. Suicide.

6. Searching Methods Used at Outdoor Scene of Crime.

7. Searching Methods Used at Indoor Crime Scene.

8. Searching Methods Used at Mobile Crime Scene.

9. Reconstruction of Scene of Crime of a Suicide.

10. Reconstruction of Scene of Crime of a Murder.

Essential Reading:

1. Nickolls L.C. (1956). Scientific Investigation of Crime. London, Bulterwest.
2. Saferstein R. (1995). Criminalistics – An Introduction to Forensic Science. USA, Prentice hall Inc.

3. Sharma B.R. (2003). Forensic Science in Criminal Investigation and Trials. India, Universal Law House.
4. Sharma J. D.(1988). Vidhivigyan Avem Vish Vigyan. India, Madhya Pradesh Hindi Granth Academy.
5. Sharma J. D. (2011). Apradh ka Vigyanik Anveshan. India, Madhya Pradesh Hindi Granth Academy.
6. Working Procedures Manual: Ballistics. (2000). India, BPR&D Pub.

Suggested Reading:

1. Brain J. H. (1997). Hand book of Firearms and Ballistics. England, John Willey.
2. Hatcher, Jury & Weller. (1977). Firearms Investigation, Identification and Evidence. Harrisburg, Stackpole Books.
3. Johari M. (1980). Identification of Firearms, Ammunition and Firearms Injuries. New Delhi, BPR&D.
4. Karl G. S. (1994). Wound Ballistics and the Scientific Background. London, Elsevier.
5. Vincent D. M. & P. A. (1999). Gunshot Wounds. USA, CRC Press.
6. Warlow T. A., (1996). Firearms, The Law and Forensic Ballistics. London, Taylor and Francis.

FSC-MDM-211- Instrumental Techniques in Forensic Science: Theory								
Level / Semester	Course Code	Title of the Course	Credit				Marks	Course Coordinator
			L	T	P	C		
L5 Sem II	FSC-MDM-211	Instrumental Techniques in Forensic Science: Theory	4	0	0	4	IA(Mid)-40 EA(End Sem)- 60	

1. **Learning Objectives:**

   To provide knowledge about the concepts of analytical chemistry, electrophoresis, microscopy, and other instrumental techniques that are commonly used in forensic science.

2. **Course Learning Outcomes :**

   Understanding about the preparation of samples, their qualitative and quantitative analysis and data handling, basic principle of instrumentation and working of spectroscopic techniques, basics of chromatographic techniques and their applications, electrophoretic method and microscopy to analyze the forensic exhibits which may facilitates to start small scale start-up.

Unit-I: Simple Separation Techniques **12 hrs**

General Idea and Basic Principle of Distillation and Various Types of Distillation Techniques. Centrifugation; Centrifuge and its Types. filtration, evaporation, and crystallization. Solvent Extraction Technique Like LLE, SPE, Micro SPE and Distribution Law.

Unit-II: Spectroscopy **12 hrs**

Basic Concept of Spectroscopy; General Idea on Spectroscopy, Electromagnetic Spectrum, Various Sources of Radiation, their Utility and Limitation.Interaction of Radiation with Matter, i.e., Reflection, Absorption, Fluorescence, etc. The Basic Concept of Atomic and Molecular Spectra Basic Principle, Instrumentation and Forensic Application of Ultraviolet-Visible and Infrared Spectroscopy. Basic Principle, Instrumentation and Forensic Application of Atomic Absorption/Emission and X-Ray Spectrometry.

Unit-III: Chromatography **12 hrs**

General Idea of Chromatography; Theory and Classification of Chromatography (Planar and Column Chromatography, Adsorption and Partition Chromatography, Ion Exchange Chromatography, Exclusion Chromatography, Affinity Chromatography), Principles, Working and Forensic Application of Planar Chromatography; TLC, PC, HPTLC. General Principles, Working and Forensic Application of Column

Chromatography General Idea on Working of HPLC and GC. Forensic Application of Chromatography

Unit-IV: Electrophoresis **12 hrs**

Electrophoretic Techniques; General Principles and Classification of Electrophoresis Factors Affecting Electrophoresis, Preparative, Horizontal, Vertical, Two Dimensional Electrophoresis, General Idea of Low Voltage Electrophoresis, High Voltage Electrophoresis, Gel Electrophoresis, Isoelectric Focusing and Capillary Electrophoresis, Forensic Application of Electrophoresis.

Unit-V: Microscopy **12 hrs**

Types of Microscopes; Simple Microscope, Compound Microscope, Comparison Microscope, Stereo Microscope, Fluorescent and Phase Contrast Microscope, SEM and TEM, Forensic Application of Microscopy.

Essential Reading:

1. Chatwal and Anand (2016). Instrumental Methods of Chemical Analysis.India, Hph.
2. Kalri P.S. (2001). Spectroscopy of Organic Compounds. India, New Age International Pub.
3. Sharma B.K.(2000). Instrumental Methods of Chemical Analysis. India, Krishna Prakashan Media.
4. Skoog D. A., Holler F.J. & Crouch S.R.(2017). Principles of instrumental analysis. USA,Cengage Learning.
5. Willard H. & Lynne L.M. (1986). Instrumental Methods of Analysis. India, CBS Publishers & Distributors.

Suggested Reading:

1. James W. R. (1996). Atomic Spectroscopy. Revised & Expanded. NY, Marcel Dekkar, Inc.
2. Patania, B. (2004). Spectroscopy. India, Campus Books International,
3. Silverstein R.M. & Francis, X.W. (1997). Spectrometric Identification of Organic Compounds, USA, John Wiley & Sons, Inc.
4. Subrahamanyam N.& Brij Lal. (2004). A Textbook of Optics. India, S. Chand & Co.
5. Thompson, K.C., & Reynolds, R.J.(1978). Atomic Absorption Fluorescence & Flame Emission Spectroscopy: A Practical Approach. London, Charles Griffin & Co.
6. Willard H. H., Merrett Jr L. L, Dean J. A & Settle Jr F. A. (1986). Instrumental Methods of Analysis. India,CBS Pub. & Distributors.

FSC-MDM-212- Instrumental Techniques in Forensic Science: Practical								
Level / Semester	Course Code	Title of the Course	Credit				Marks	Course Coordinator
			L	T	P	C		
L5 Sem II	FSC-MDM-212	Instrumental Techniques in Forensic Science: Practical	0	0	2	2	IA(Mid)-40 EA(End Sem)- 60	

1. **Learning Objectives:**

   To provide an understanding of the concept of analysis of trace evidence, extraction of sample and chromatographic analysis.

2. **Course Learning Outcomes :**

   Understanding about the trace analysis of cation and anion in physical evidence obtained from the crime scene, different extraction techniques for forensic exhibit analysis, basic principle and working of spectroscopic and chromatographic techniques that could lead to professional job opportunities in testing laboratories.

List of Practical **60 hrs**

1. Identification of Anion and Cations by Spot Test.
2. Isolation of Non-Volatile Poison by Solvent Extraction.
3. Extraction of Ethanol by Simple Distillation.
4. Measurement of Absorption Maxima of some Organic Solvent by UV-Visible Spectrophotometer.
5. Calculation of Strength of some Organic Solvent by UV-Visible Spectrophotometer.
6. Separation of some Metal Ions by Paper Chromatography.
7. Separation of some Basic Drugs by Thin Layer Chromatography.
8. Separation of some Pesticide by Thin Layer Chromatography.

Essential Reading:

1. Chatwal and Anand (2016). Instrumental Methods of Chemical Analysis.India, Hph.
2. Kalri P.S. (2001). Spectroscopy of Organic Compounds. India, New Age International Pub.
3. Sharma B.K.(2000).Instrumental Methods of Chemical Analysis. India, Krishna Prakashan

Media.
4. Skoog D. A., Holler F.J.& Crouch S.R.(2017). Principles of Instrumental Analysis.USA,Cengage Learning.
5. Willard H. & Lynne L.M. (1986).Instrumental Methods of Analysis. India, CBS Publishers & Distributors.

Suggested Reading:

1. James W. R. (1996). Atomic Spectroscopy. Revised & Expanded. NY, Marcel Dekkar, Inc.
2. Patania B. (2004). Spectroscopy. India, Campus Books International,
3. Silverstein R.M. & Francis X. W. (1997). Spectrometric Identification of Organic Compounds,USA,John Wiley & Sons, Inc.
4. Subrahamanyam N.& Brij Lal. (2004). A TextBook of Optics. India, S. Chand & Co.
5. Thompson K.C. & Reynolds R.J.(1978). Atomic Absorption Fluorescence & Flame Emission Spectroscopy: A Practical Approach. London, Charles Griffin & Co.
6. Willard H. H., Merrett Jr L. L, Dean J. A & Settle Jr F. A. (1986). Instrumental Methods of Analysis. India,CBS Pub. & Distributors.

FSC-SEC-211- The Basics of Fingerprints								
Level Or Semester	Course Code	Title of the Course	Credit				Marks	Course Coordinator
			L	T	P	C		
L5 Sem II	FSC-SEC-211	The Basics of Fingerprints	2	0	0	2	IA(Mid)-40 EA(End Sem)- 60	

1. **Learning Objectives:**
   To gain knowledge about fingerprints, the development of fingerprints, classification, and databases.
2. **Course Learning Outcomes :**
   Understanding the basics of fingerprints, history, patterns, and classification. biometrics & face recognition, types of fingerprints, location, development, photography & comparison.

Unit-I: Introduction & History of Fingerprints **6 hrs**

Introduction of Fingerprint, The History of Fingerprints in Indian Context Development of Fingerprints for Criminal Investigation around the World use of fingerprints in the solving of crimes.

Unit-II: Basics & Formation of Fingerprinting **6 hrs**

Biological Basis of Fingerprints, Formation of Ridges, Types of Fingerprint, Fingerprint Patterns, Fingerprint Characters/Minutiae.

Unit III: Principles & Classification of Fingerprinting **6 hrs**

The Fundamental Principles of Fingerprinting, Primary Classification of Fingerprints, Secondary Classification of Fingerprints, Sub-secondary Classification of Fingerprints, Single digit Classification of Fingerprints, Major Classification of Fingerprint, Key Classification of Fingerprint.

Unit-IV: Methods of Development of Fingerprints **6 hrs**

Searching of Latent Fingerprints on Different Surfaces at Scene of Crime, Latent Fingerprints Enhancement by Physical and Chemical Techniques, Mechanisms of Detection of Fingerprints by different developing reagents, application of light Sources in Fingerprint Detection, Preservation of Developed Fingerprints,

Unit V: Collection & Matching of Fingerprint **6 hrs**

The Collection of Plain and Rolled Fingerprints, Matching of Fingerprints, Use of Fingerprints in Civil and Criminal Cases, Presentation of Fingerprint Evidence in Courts, Advancements in

Fingerprint Technology, Fingerprint Databases: AFIS, IAFIS, etc.

Essential Reading:

1. Ashbaugh D. R. (1999). Quantitative and Qualitative Friction ridge analysis. India, CRS Press.
2. Daluz H. M. (2014).Fundamentals of Fingerprint Analysis. India, CRC Press.
3. Hardless H.R. (1988). Disputed Documents, Handwriting and Thumbs – Print Identification, Profusely Illustrated. India: Low Book Co.
4. Lee H. C. & Ganesslen R. E. (1991). Advances in Fingerprint Technology. London: RC Press, Boca Raton.
5. Osborn A. S. (1998). The Problem of Proof. India, Universal Law Publishing.
6. Pierce D. S. (2011).Mechanics of Impression Evidence. India, CRC Press.
7. Stiefel C. (2011).Fingerprints: Dead People Do Tell Tales. USA, Enslow Publishers.

Suggested Readings:

1. Ashbaugh D. R. (1999). Quantitative and Qualitative, CRS Press, India.
2. Daluz H. M. (2014).Fundamentals of Fingerprint Analysis. India, CRC Press.
3. Hardless H.R. (1988). Disputed documents, handwriting and thumbprint identification, profusely illustrated. India, Law Book Co., Allahabad.
4. Lee H. C. & Gaensslen R. E. (1991), Advances in Fingerprint Technology. London, RC Press, Boca Raton.
5. Maltoni D. (2009).The Handbook of Fingerprint Recognition. Germany, Springer Science & Business Media.
6. Pierce D. S. (2011). Mechanics of Impression Evidence. India, CRC Press.
7. Stiefel C. (2011).Fingerprints: Dead People Do Tell Tales. USA, Enslow Publishers.

FSC-AEC-211- Introduction to DNA fingerprinting-I								
Level/ Semester	Course Code	Title of the Course	Credit				Marks	Course Coordinator
			L	T	P	C		
L5 Sem II	FSC-AEC-211	Introduction to DNA Fingerprinting- I	2	0	0	2	IA(Mid)-40 EA(End Sem)- 60	

1. **Learning Objectives:**

   To enhance the skills in genetics, DNA and its different methods, and its further use in forensic science to solve criminal cases.

2. **Course Learning Outcomes :**

   Understanding about the usefulness of genetic markers in forensic investigations, different techniques for DNA extraction, isolation, and amplification.

Unit I: Origin of Species **8 hrs**

Determination of Human and Animal Origin Form Bones, Hair, Flesh, Nails, Skin, Teeth, Body Tissue, Fluids/Stains viz. Blood, Menstrual Blood, Semen, Saliva, Sweat, Tear, Pus, Vomit etc., through Immuno-Diffusion and Immuno-Electrophoresis, Cross Reactivity Among Closely Related Species. Superimposition Techniques for the Skull.

Unit-II: Basic Concepts of Genetics **5 hrs**

Structure and Function of Cells, Mendelian Genetics, Genotypes, Phenotypes, Mutations, Multiple Alleles.

Unit-III: Basics of DNA **5 hrs**

Structure of DNA, Damage to DNA, Variation in DNA, Basis of DNA Typing.

Unit-IV: Techniques for Individualization **6 hrs**

Personal Identity: Techniques (Electrophoresis), Polymorphic Enzymes Typing- PGM, ESD, EAP, AK, etc.), HLA Typing, Paternity Disputes.

Unit V: DNA Methods **6 hrs**

DNA extraction, isolation, and amplification. PCR, RFLP.

Essential Readings:

1. Parikh C.K. (1972). Forensic Medicine and Toxicology. India, Medical Publications.

2. Polson C.J., Gee, D.J., and Knight, B. (1985). The Essentials of Forensic Medicine, France,Pergamon Press.
3. Simpsen K. & Knight B. (1996). Forensic Medicine 11 th edit. USA,Taylor & Francis.
4. Kimball & John W. (1974). Biology. New Delhi, Arvind Publishing Co.
5. Oates D.W., Brown, C.W., & Weigel, D.L. (1974). Blood and Tissue Identification of Selected Birds and Mammals. JPR Study Projects Lincoln, NE, Nebraska Gome and Perks Commission. Philadelphia, Staff Research Publications.
6. Walker, J.M., & Rapley, R. (2009). Molecular Biology and Biotechnology London,Royal Society of Chemistry
7. Williams, P. L., & Warwick, R.(1980). Gray's Anatomy London, Churchill, Livingston.
8. Lewis. B. (1980). Gene IV. England, Oxford University Press.

Suggested Readings:

1. Albert S., Bray B., Lewis D., Roberts K., and Watson J.D. (1989). Molecular Biology of the Cell. New York,Garland Pub.
2. Clifford & B.J.(1971). The Examination and Typing of Bloodstains in the Crime Laboratory. USA, US Court Printing Press.
3. Edwin & Caney, H. M. (1993). Human Genetics: The Molecular Revolution. London, Jones & Bartlett Pub.
4. Gardner E.J., Simmons M. I. & Snustad D.P.(1991). Principles of Genetics. New York, John Wiley.
5. Taylor A. S. (1853). Medical jurisprudence. Philadelphia, Blanchard & Lea.
6. Thompson T., Black, S. (2006). Forensic Human Identification: An Introduction. NY, CRC Press.
7. Vij K. (2014). Forensic Medicine & Toxicology: Principles & Practice. India, Elsevier Health Sciences.