



# **ROYAL SCHOOL OF LIFE SCIENCES (RSLSC)**

## **Department of Forensic Science**

**Course Structure & Syllabus  
(Based on National Education Policy 2020)**

**For Postgraduate Programme**

**M.Sc. IN FORENSIC SCIENCE  
(2 Years)**

**WEF AY 2025-26**

## **STRUCTURE OF THE SYLLABUS FOR 2 YEAR PG PROGRAMME**

**SCHOOL NAME**                      - Royal School of Life Sciences

**DEPARTMENT NAME**        - Department of Forensic Science

**PROGRAMME NAME**        - M.Sc. Forensic Science

<b>1<sup>st</sup> SEMESTER</b>				
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>LEVEL</b>	<b>CREDIT</b>	<b>L-T-P</b>
FSC144C101	Forensic Science and Crime Scene Management	400	4	3-1-0
FSC144C102	Criminology and Law	400	4	3-1-0
FSC144C103	Instrumental Methods	400	4	3-1-0
FSC144C104	Forensic Physics and Ballistics	400	4	3-1-0
FSC144C115	Forensic Science and Criminalistics (Practical)	400	4	0-0-8
FSC144C116	Forensic Physics and Ballistics (Practical)	400	4	0-0-8
MOOCs - I	*MOOCs/online courses will be identified by the department from the list of courses available on the MOOCs online platform/SWAYAM portal	400	4	
<b>TOTAL CREDIT FOR 1<sup>st</sup> SEMESTER</b>			<b>24</b>	
<b>2<sup>nd</sup> SEMESTER</b>				
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>LEVEL</b>	<b>CREDIT</b>	<b>L-T-P</b>
FSC144C201	Forensic Chemistry and Toxicology	500	4	3-1-0
FSC144C202	Questioned Document and Dermatoglyphics	500	4	3-1-0
FSC144C213	Forensic Chemistry and Toxicology (Practical)	500	4	0-0-8
FSC144C214	Questioned Document and Dermatoglyphics (Practical)	500	4	0-0-8
MOOCs - II	*MOOCs/online courses will be identified by the department from the list of courses available on the MOOCs online platform/SWAYAM portal	500	4	
<b>TOTAL CREDIT FOR 2<sup>nd</sup> SEMESTER</b>			<b>24</b>	
<b>TOTAL CREDIT FOR 1<sup>st</sup> YEAR = 48</b>				
<b>3<sup>rd</sup> SEMESTER</b>				
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>LEVEL</b>	<b>CREDIT</b>	<b>L-T-P</b>
FSC144C301	Forensic Biology and Wildlife Forensics	500	4	3-1-0
FSC144C302	Digital Forensics	500	4	3-1-0
FSC144C313	Forensic Biology (Practical)	500	4	0-0-8
FSC144C324	Project Dissertation	500	8	
<b>OR 3<sup>rd</sup> SEMESTER</b> <b>(For students with 3<sup>rd</sup> and 4<sup>th</sup> Semester Research)</b>				

FSC144C325	Project Dissertation	500	20	
<b>TOTAL CREDIT FOR 3<sup>rd</sup> SEMESTER</b>			<b>20</b>	
<b>4<sup>th</sup> SEMESTER</b>				
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>LEVEL</b>	<b>CREDIT</b>	<b>L-T-P</b>
FSC144C401	Forensic Medicine and Anthropology	500	4	3-1-0
FSC144C402	Forensic Psychology	500	4	3-1-0
FSC144C423	Project Dissertation	500	12	
<b>OR 4<sup>th</sup> SEMESTER</b>				
<b>(For students with 3<sup>rd</sup> and 4<sup>th</sup> Semester Research)</b>				
FSC144C424	Project Dissertation	500	20	
<b>TOTAL CREDIT FOR 4<sup>th</sup> SEMESTER</b>			<b>20</b>	
<b>TOTAL CREDIT FOR 2<sup>nd</sup> YEAR = 40</b>				

## SEMESTER - I

<b>Paper Sl. No.</b>	Paper - 1	<b>Scheme of Evaluation</b>	Theory
<b>Name of the Course</b>	Forensic Science and Crime Scene Management	<b>L-T-P-C</b>	3-1-0-4
<b>Type of Course</b>	Core	<b>Credits Assigned</b>	4
<b>Paper Code</b>	FSC144C101	<b>Level of the Course</b>	400

**Course objective:** The objective of this course is to introduce the students to Forensic Science and its role in the criminal investigation system. The students would be appraised about the function & principles of Forensic Science & its historical background. This course shall provide the students necessary information to understand the role of Forensic Laboratories in crime scene investigation, handling of evidence and their examination. Additionally, students will also learn about Indian Police system and various techniques used in criminal profiling.

<b>Course Outcome :</b> After successful completion of the course, student will be able to		
<b>CO</b>	<b>Course Outcome</b>	<b>Bloom's Taxonomy Level</b>
CO1	<b>recall</b> the core definitions, historical developments, legal frameworks, branches, and organizational structure of forensic science.	BT1
CO2	<b>explain</b> the systematic procedures of crime scene management.	BT2
CO3	<b>apply</b> knowledge of forensic report components, legal standards for evidence admissibility.	BT3
CO4	<b>analyze</b> physical patterns to differentiate between identification, individualization, and reconstruction processes.	BT4

<b>Module</b>	<b>Course content</b>	<b>Lectures</b>
<b>I</b>	<b>Introduction to Forensic Science:</b> Definition, Need, Scope, Concepts and Significance of Forensic Science, History and Development of Forensic Science, Laws and Basic principles of Forensic Science, Branches of forensic science, Organizational set-up of a Forensic Science Laboratories. Investigative strategies, Expert testimony and eye-witness report.	<b>22</b>
<b>II</b>	<b>Crime Scene Management:</b> Crime Scene: Introduction, Types, Significance, Role of Investigator, Steps of Crime Scene Management: Protection, Searching Methods, Documentation of the Crime Scene; Collection, Preservation, Packaging, Chain of Custody: Types, Significance and Evaluation, Reconstruction of scene of crime, Report writing.	<b>23</b>

<b>III</b>	<b>Report and Evidence Evaluation:</b> Components of reports and Report formats in Crime Scene and findings. Constitutional validity of Forensic Evidence, Expert Testimony: Admissibility in court of law, Pre-Court preparations & Court appearance, FIR and its types.	<b>22</b>
<b>IV</b>	<b>Importance of Physical patterns:</b> Physical patterns in identification, individualization and reconstruction. Pattern due to blood, Pattern on glass, firearms related patterns, patterns in arson and fires served articles and physical matches, comparison of imprints, indentation, striation, typical presentations, Gait patterns, Bite patterns. Modus operandi, portrait parley.	<b>23</b>
<b>Total</b>		<b>90</b>

**Notional Credit Hours for the course = 30 x 4 = 120**

<b>Distribution of Credits</b>		
<b>Lectures/ Tutorial</b>	<b>Practicum</b>	<b>Experiential Learning</b>
90	0	30 Discussions, Presentations and Quiz, Case Solving

**Textbooks:**

1. Hess, A.K. and Weiner, I.B. Handbook of Forensic Psychology 2nd ed. Jhon Wiley & Sons (1999)
2. James, S.H Scientific and Legal Application of Bloodstain Pattern Interpretation, CRC Press, Boca Raton, (1998)
3. James, S.H. and Nordby, J.J. Forensic Science: An Introduction to Scientific and Investigative Techniques, CRC press, USA (2003)

**Reference Books:**

1. Kleiner, M. Handbook of Polygraph Testing, Academic Press (2002)
2. Lyman, M.D. Criminal Investigation- The Art and the Science, Prentice Hall (2002)

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**SEMESTER - I**

<b>Paper Sl. No.</b>	Paper - 2	<b>Scheme of Evaluation</b>	Theory
<b>Name of the Course</b>	Criminology and Law	<b>L-T-P-C</b>	3-1-0-4
<b>Type of Course</b>	Core	<b>Credits Assigned</b>	4
<b>Paper Code</b>	FSC144C102	<b>Level of the Course</b>	400

**Course objective:** The objective of this course is to introduce students about the concepts of Crime, Criminology and the factors that contribute to a person becoming antisocial. The students gain knowledge regarding Police Administration, Indian Judiciary & Criminal

Justice System. To introduce the different sections of IPC, CrPC and the Indian Evidence Act & the Acts pertaining to Forensic Science.

<b>Course Outcome :</b> After successful completion of the course, student will be able to		
<b>CO</b>	<b>Course Outcome</b>	<b>Bloom's Taxonomy Level</b>
CO1	<b>define</b> concept of Criminology	BT1
CO2	<b>illustrate</b> legal provisions focusing on different types of crimes	BT2
CO3	<b>apply</b> various IPC, CrPC, IEA & Acts pertaining to Forensic Science.	BT3
CO4	the detailed <b>analysis</b> & significance of Criminal Profiling for the purpose of justice	BT4

<b>Module</b>	<b>Course content</b>	<b>Lectures</b>
<b>I</b>	<b>Crime and Society:</b> Concept and Definition of Crime, Causes and Elements of Crime, Social Change and Crime, Control and Prevention of Crime, Hate Crime, Organized Crime, Cyber Crime, Industrialization, Criminal Behavior: Theories and Significance, Characteristics of crime (Actus Reus, Mens Rea, Prohibited Act & Punishments) Modus Operandi and Criminal Psychology, Crime Rate in India and in World, NCRB.	<b>22</b>
<b>II</b>	<b>Indian Judiciary and Criminal Justice System:</b> Criminal Justice System: Introduction, Structure, Components and Working. Indian Judiciary: Introduction, Courts: Hierarchy, Types, Procedure, Power and Jurisdiction, Prosecution and defence. Lok Adalat, Lokpal, Lokayukta, Juvenile Court Evidence, Enquiry, Investigation, Trial, FIR, Panchnama Inquest Charge Sheet, Dying Declaration and Dying deposition. A subpoena (summons).	<b>23</b>
<b>III</b>	<b>Laws and Legal Framework:</b> Bhartiya Nyaya Sanhita (BNS), 2023; Key Changes from IPC to BNS; Forensic Relevance; Bhartiya Sakshya Adhiniyam (BSA), 2023; Key Changes from IEA to BSA; Recent Updates: Supreme Court guidelines on the admissibility of modern forensic tools; Bhartiya Nagarik Suraksha Sanhita (BNSS), 2023; Key Provisions for Forensic Investigations; Key Changes from CrPC to BNS; Bailable and Non Bailable Offences. Cognizable and Non Cognizable Offences.	<b>23</b>
<b>IV</b>	<b>Act Pertaining to Forensic Science:</b> Narcotic Drugs and Psychotropic Substances Act, Drugs and Cosmetics Act, Explosive Substances Act, Dowry Prohibition Act, Arms Act, Wild Life Protection Act 1972, Environmental Protection Act, 1986; Forensic investigations in environmental crimes (e.g., illegal dumping, air/water pollution); I.T. Act (Information Technology Act- 2000); POCSO Act; The Criminal Procedure (Identification) Act-2022.	<b>22</b>

<b>Total</b>	<b>90</b>
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**Notional Credit Hours for the course = 30 x 4 = 120**

<b>Distribution of Credits</b>		
<b>Lectures/ Tutorial</b>	<b>Practicum</b>	<b>Experiential Learning</b>
90	0	30 Discussions, Presentations and Quiz, Case Solving

**Text Books:**

1. Adler, F.: Mueller, G.O.W. and Laufer, W.S. (2006) Criminology 5th ed. McGraw Hill.
2. Arrigo, B.A. (2002): Introduction to Forensic Psychology, Academic Press Inc.

**Reference Books:**

1. Barak, G. (1998): Integrative Criminology, Dartmouth Publishing Co. Ltd.
2. Biderman, A.D. and Zimmer, H. (1961): The Manipulation of Human Behavior, Wiley, New York.

**SEMESTER - I**

<b>Paper Sl. No.</b>	Paper - 3	<b>Scheme of Evaluation</b>	Theory
<b>Name of the Course</b>	Instrumental Methods	<b>L-T-P-C</b>	3-1-0-4
<b>Type of Course</b>	Core	<b>Credits Assigned</b>	4
<b>Paper Code</b>	FSC144C103	<b>Level of the Course</b>	400

**Course objective:** This course aims to establish a comprehensive understanding of electromagnetic radiation (EMR), wave-quantum mechanics (including Bohr theory, De Broglie hypothesis, and Heisenberg uncertainty principle), and EMR-matter interactions, underpinning analytical techniques. Students will master the principles, instrumentation, and forensic applications of spectroscopy (UV-Vis, IR, Raman, AAS, NMR, Mass), chromatography (HPLC, GC, hyphenated methods), centrifugation, and microscopy. The curriculum emphasizes hands-on proficiency in operating advanced instruments for molecular analysis, spectral interpretation, and separation of complex mixtures in scientific and forensic contexts.

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	<b>recall</b> foundational theories and principles of electromagnetic radiation (EMR).	BT1
CO2	<b>explain</b> the fundamental principles, instrumentation components, and analytical applications of spectroscopic techniques.	BT2
CO3	<b>apply</b> chromatographic separation techniques and hyphenated methods to solve forensic and analytical problems.	BT3
CO4	<b>analyze</b> the principles and operational parameters of centrifugation and microscopy techniques.	BT4

Module	Course content	Lectures
<b>I</b>	<b>Fundamentals of Instrumentation:</b> Electromagnetic radiations (EMR) their properties and parameters on the basis of wave and quantum mechanics, interaction of EMR with matter, electronic spectra and molecular structure, photoelectric effect, wave and quantum mechanics, De Broglie hypothesis, Bohr atomic theory, Heisenberg uncertainty principle, Planck's Quantum theory, Davisson and Germer Experiment.	<b>22</b>
<b>II</b>	<b>Spectroscopy:</b> Ultraviolet and visible spectroscopy: Instrumentation and Applications, Infrared Spectroscopy: Molecular vibration, Theory of IR absorption, Instrumentation and Applications, Raman Spectroscopy: Theory of Raman, Instrumentation, Applications, Atomic absorption spectrometry: Instrumentation and Applications of Flame emission, Mass Spectroscopy: Theory, Instrumentation and Applications, Proton NMR: Theory and principle, Instrumentation and Applications.	<b>23</b>
<b>III</b>	<b>Chromatography :</b> Theory of separation techniques, Types of chromatography and their Forensic Applications; Thin layer chromatography; High Performance Liquid Chromatography: Principle, instrumentation and applications; Gas Chromatography: Principle, instrumentation and applications; Hyphenated techniques: LC-MS-MS (Tandem); GC-MS, GC-MS-MS (Tandem).	<b>22</b>
<b>IV</b>	<b>Centrifugation techniques:</b> Basic principle of centrifugation and sedimentation, various types of centrifuges, density gradient centrifugation, preparative centrifugation, analysis of sub-cellular fractions, ultra- centrifuge, refrigerated centrifuges.  <b>Microscopy:</b> Basic principles of microscopy, simple and compound microscope, comparison microscope, phase contrast microscope, stereoscopic microscope, polarizing microscope, fluorescence microscope.	<b>23</b>
<b>Total</b>		<b>90</b>



**Notional Credit Hours for the course = 30 x 4 = 120**

<b>Distribution of Credits</b>		
<b>Lectures/ Tutorial</b>	<b>Practicum</b>	<b>Experiential Learning</b>
90	0	30 Discussions, Presentations and Quiz, Case Solving

**Textbooks:**

1. G.D.Christian and J.E.O'Reilly, Instrumental Analysis, Allyn and Bacon, Inc., Boston.
2. F.W.Fifield and D.Kealey, Principles and practice of Analytical Chemistry, International Textbook Company, London.
3. R.P.Bauman, Absorption Spectroscopy, John Wiley, New York.
4. M.Donhrow, Instrumental Methods in Analytical Chemistry; Their Principles and practice Vol.2, optical method, Pitaman, New York.

**Reference Books:**

1. G.G.Guilbanlt, Practical Fluorescence: Theory, Methods and Practice, Marcel Dekker, New York.
2. S.Udenfriend, Fluorescence Assay in Biology and Medicine, Academic Press, New York.
3. W.J.Price, Spectrochemical Analysis by Atomic Absorption, Hyden, London.
4. R.S.Alger, Electron Paramagnetic Resonance: Techniques and Applications, Interscience, New York.

**SEMESTER - I**

<b>Paper Sl. No.</b>	Paper - 4	<b>Scheme of Evaluation</b>	Theory
<b>Name of the Course</b>	Forensic Physics and Ballistics	<b>L-T-P-C</b>	3-1-0-4
<b>Type of Course</b>	Core	<b>Credits Assigned</b>	4
<b>Paper Code</b>	FSC144C104	<b>Level of the Course</b>	400

**Course objective:** This course aims to equip students with the technical expertise to analyze tool marks, fibers, erased/bite marks, ammunition, and firearms through forensic methodologies. It covers principles of tool mark identification, fiber comparison, restoration of obliterated marks, bite mark morphology, ammunition construction, firearm classification, and ballistic evidence analysis (e.g., GSR, microscopy). The curriculum emphasizes practical skills in evidence collection, preservation, and legal compliance (e.g., Indian Firearm Act) to support criminal investigations and courtroom testimony.

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	<b>recall</b> foundational concepts of tool marks (types, class/individual characteristics, collection/preservation) and fiber/cloth evidence.	BT1
CO2	<b>explain</b> the principles, techniques, and forensic protocols for restoring erased/obliterated marks.	BT2
CO3	<b>apply</b> knowledge of ammunition construction, classification, and safety protocols to handle, disassemble, and classify firearm components.	BT3
CO4	<b>analyze</b> class and individual characteristics on cartridge cases and projectiles, along with GSR composition and distribution.	BT4

Module	Course content	Lectures
<b>I</b>	<b>Tool Mark &amp; Fiber Evidence:</b> Introduction to tool marks, Types of tool marks, Class characteristics and individual characteristics of tool marks, Collection and Preservation of tool marks, Forensic examination of tool marks, Case Studies, Fibre evidence: artificial and man-made fibres. Collection of fibre evidence. Identification and comparison of fibres. Cloth evidence: importance, collection, analysis of adhering material. Matching of pieces.	<b>22</b>
<b>II</b>	<b>Erased marks &amp; Bite marks:</b> Principle of restoration of erased marks, Techniques involved for alteration of individual markings, Restoration of erased and obliterated marks on various surfaces, Photography and Forensic assessment of methods for restoration of obliterated marks, Objectives and forensic importance of bite-mark examination, the typical bite marks morphology, types of bite marks, Evidence collection from victims and suspects, Photography, lifting, preservation of bite marks, casting of bite marks, Identification and comparison of bite marks.	<b>23</b>
<b>III</b>	<b>Ammunition:</b> Definition, Ammunition & its constructional parts, Introduction to Shotgun ammunition and Rifle Ammunition, Classifications of Ammunition on basis of constructional features, Functional assembly of different types of ammunition & their types, Safety aspects for handling firearms and ammunition, cartridge-firing mechanism. Bullet and its types, Case studies related to firearm cases, Indian Firearm Act: Introduction to Act, Basic concepts of chapters describe in Act, Prohibited & Non-Prohibited Firearms calibres.	<b>22</b>

<b>IV</b>	<b>Firearms:</b> Identification of firearms, ammunition and their components: Principles, Processing of Firearm Exhibits involved, Class characteristics & Individual characteristics (Identifiable marks) produced during firing process on cartridge cases & projectiles and their linkage with firearms, Analysis of GSR: Composition of GSR, Location & Collection, Mechanism of formation, Techniques involved in ballistic studies, Stereo and comparison microscopy, BDAS, IBIS.	<b>23</b>
<b>Total</b>		<b>90</b>

**Notional Credit Hours for the course = 30 x 4 = 120**

<b>Distribution of Credits</b>		
<b>Lectures/ Tutorial</b>	<b>Practicum</b>	<b>Experiential Learning</b>
90	0	30 Discussions, Presentations and Quiz, Case Solving

**Textbooks:**

1. Forensic Science Evidence: Can the Law Keep Up With Science (Criminal Justice: Recent Scholarship by Donald E. Shelton
2. M. Byrd, Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence, CRC Press, Boca Raton (2001).
3. T.J. Gardener and T.M. Anderson, Criminal Evidence, 4th Ed., Wadsworth, Belmont (2001).
4. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific and Investigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005).

**Reference Books:**

5. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013).
6. Brain J. Heard; Hand Book Of Firearms And Ballistics; John Willey, England.
7. TA, Warlow; Firearms, The Law And Forensic Ballistics; Taylor And Francis, Landon.
8. Karl G. Sellier et al ; Wound Ballistics And The Scientific Background; Elsevier, London.

**SEMESTER - I**

<b>Paper Sl. No.</b>	<b>Paper - 5</b>	<b>Scheme of Evaluation</b>	<b>Practical</b>
<b>Name of the Course</b>	Forensic Science and Criminalistics (Practical)	<b>L-T-P-C</b>	0-0-8-4
<b>Type of Course</b>	Core	<b>Credits Assigned</b>	4
<b>Paper Code</b>	FSC144C115	<b>Level of the Course</b>	400

**Course objective:** The objective of the course is to develop practical approach among the students in different types of crime scenes, their management and reconstruction. They will also learn about collection, packaging, forwarding and examination of various types of physical evidences found at crime scene.

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	<b>list</b> different reports of NCRB, CrPC, etc.	BT1
CO2	<b>understand</b> the nature of various tools & techniques used in Forensic Examination	BT2
CO3	<b>develop</b> the art of collection, packaging, preservation & analysis of trace evidences.	BT3
CO4	<b>distinguish</b> the types of scene of crime and evidence types.	BT4

Module	Course content	Lectures
<b>I</b>	1. To study the history of crime cases from forensic science perspective. 2. To cite examples of crime cases in which apprehensions arose because of Daubert standards. 3. To study the annual reports of National Crime Records Bureau and depict the data on different type of crime cases by way of smart art/templates. 4. To write report on different type of crime cases.	<b>22</b>
<b>II</b>	5. To review how the Central Fingerprint Bureau, New Delhi, coordinates the working of State Fingerprint Bureaus. 6. To examine the hierarchical set up of different forensic science establishments and suggest improvements. 7. The use of searching methods for crime scene (Outdoor and Indoor SOC). 8. Fingerprints lifting from the scene of crime. (latent, patent).	<b>23</b>
<b>III</b>	9. Physical matching of Cloth piece and/or rope piece and /or garments or broken pieces of different objects. 10. Physical and microscopic studies of affected electric wires, panel boards due to electrical overload and short-circuit. 11. Outdoor crime scene investigation (Accident). 12. Indoor crime scene investigation (Murder).	<b>22</b>

<b>IV</b>	13. Collection of evidence –with proper equipment and tools. 14. Packing, Labelling and Sealing of evidences from crime scene. 15. Sketching and photography of crime scenes. 16. Physical and microscopic studies of gems and fibers.	<b>23</b>
<b>Total</b>		<b>90</b>

**Notional Credit Hours for the course = 30 x 4 = 120**

<b>Distribution of Credits</b>		
<b>Lectures/ Tutorial</b>	<b>Practicum</b>	<b>Experiential Learning</b>
00	90	30 Discussions, Presentations and Quiz, Case Solving

**Textbooks:**

1. Forensic Science: Fundamentals and Investigations by Anthony J. Bertino.
2. Criminalistics: An Introduction to Forensic Science by Richard Saferstein.

**Reference Books:**

3. Forensic Science: From the Crime Scene to the Crime Lab by Richard Saferstein.
4. Crime Scene Investigation: Methods and Procedures by Ian Pepper.
5. Forensic Fingerprints by Allan Gaw and Jim Fraser.

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**SEMESTER - I**

<b>Paper Sl. No.</b>	Paper - 6	<b>Scheme of Evaluation</b>	Practical
<b>Name of the Course</b>	Forensic Physics and Ballistics (Practical)	<b>L-T-P-C</b>	0-0-8-4
<b>Type of Course</b>	Core	<b>Credits Assigned</b>	4
<b>Paper Code</b>	FSC144M116	<b>Level of the Course</b>	400

**Course objective:** This course aims to equip students with expertise in firearms examination (caliber, rifling, GSR analysis), ballistic dynamics (velocity, angle/direction of fire), and tool/impression evidence analysis (tool marks, cloth matching, foot/tyre/bite prints). It integrates chemical, microscopic, and instrumental techniques (BDAS, casting methods) to link suspects to crimes, reconstruct shooting incidents, and validate forensic evidence for legal proceedings..

<b>Course Outcome</b> : After successful completion of the course, student will be able to		
<b>CO</b>	<b>Course Outcome</b>	<b>Bloom's Taxonomy Level</b>
CO1	<b>identify</b> the characteristics of firearms and methods for determining shot numbers.	BT1
CO2	<b>explain</b> the principles of propellant identification.	BT2
CO3	<b>apply</b> ballistic software (BDAS) to determine bullet velocity.	BT3
CO4	<b>analyze</b> cast foot/tyre impressions and latent foot marks.	BT4

<b>Module</b>	<b>Course content</b>	<b>Lectures</b>
<b>I</b>	1. Characteristics of Firearms-Caliber, Choke, Trigger pull, and Proof marks. 2. Examination and comparison of fired bullet with reference to caliber, rifling characteristics, and identification of firearm. 3. Examination and comparison of fired cartridge case with reference to caliber, firing pin, breech face, chamber indentations, extraction, and ejector marks by comparison microscope. 4. Determination of shot numbers from size and weight of shots.	<b>22</b>
<b>II</b>	5. Identification of propellants. 6. Chemical tests for powder residue and barrel wash. 7. Instrumental examination of Gunshot Residues. 8. Study on Deformed bullets.	<b>23</b>
<b>III</b>	9. Determination of velocity using BDAS. 10. Determination of angle and direction of fire on different surfaces. 11. To identify and compare tool marks. 12. To compare cut or torn cloth samples by physical matching.	<b>22</b>
<b>IV</b>	13. Casting of foot and tyre impressions. 14. Identification and comparison of ear prints and lip prints. 15. Casting of bite marks. 16. Development of latent foot marks.	<b>23</b>
<b>Total</b>		<b>90</b>

**Notional Credit Hours for the course = 30 x 4 = 120**

<b>Distribution of Credits</b>		
<b>Lectures/ Tutorial</b>	<b>Practicum</b>	<b>Experiential Learning</b>
00	90	30 Discussions, Presentations and Quiz, Case Solving

**Textbooks:**

1. E.R.Mengel; Forensic Physics in 2002 year book, McGraw hill Encyclopedia of Science & Technology.
2. Dennis Shaw; Physics in the Prevention and Detection of Crime, Contem Phys. Vol 7.

**Reference Books:**

3. Brain J. Heard., Hand Book Of Firearms And Ballistics; John Willey, England.
  4. TA, Warlow; Firearms, The Law And Forensic Ballistics; Taylor And Francis, Landon.
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## SEMESTER - II

<b>Paper Sl. No.</b>	Paper - 1	<b>Scheme of Evaluation</b>	Theory
<b>Name of the Course</b>	Forensic Chemistry and Toxicology	<b>L-T-P-C</b>	3-1-0-4
<b>Type of Course</b>	Core	<b>Credits Assigned</b>	4
<b>Paper Code</b>	FSC144C201	<b>Level of the Course</b>	500

**Course objective:** This course aims to integrate principles of chemical forensics (bribe traps, ink/polymer analysis, food adulteration), explosives/petroleum analysis (post-blast residue, arson dynamics), and drug toxicology (NDPS Act compliance, addiction mechanisms) with hands-on skills in analytical techniques (GC-MS, TLC, color tests). It emphasizes quality assurance (ISO, GLP) and crime scene protocols to prepare students for forensic casework, ensuring legal admissibility and scientific rigor in criminal investigations and courtroom testimony.

<b>Course Outcome :</b> After successful completion of the course, student will be able to		
<b>CO</b>	<b>Course Outcome</b>	<b>Bloom's Taxonomy Level</b>
CO1	<b>define</b> the fundamental principles of chemical forensics, including phenolphthalein analysis in bribe traps, ink/polymer dating protocols.	BT1
CO2	<b>classify</b> explosives into organic and inorganic categories.	BT2
CO3	<b>apply</b> the NDPS Act (1985) to classify controlled substances.	BT3
CO4	<b>analyze</b> the roles of accreditation systems (ISO, ILAC/APLAC) and quality protocols in forensic chemical analysis.	BT4

<b>Module</b>	<b>Course content</b>	<b>Lectures</b>
<b>I</b>	<b>Chemical Forensics:</b> Introduction to Forensic Chemistry, Bribe Traps: Phenolphthalein analysis. Inks & Polymers: Dating/aging of inks, plastic/adhesive examination, Food Adulteration: Lipid analysis, Crime Scene Protocols: Narcotics evidence collection, clandestine lab investigation, isolation/purification techniques, Presumptive tests: Marquis reagent for opioids.	<b>22</b>
<b>II</b>	<b>Explosives, Fire Dynamics &amp; Petroleum Analysis:</b> Explosives: Classification (organic/inorganic), post-blast residue analysis (TLC, color tests). Case studies (e.g., terrorism, industrial accidents), Fire & Arson: Thermodynamics, fire debris analysis (GC-MS), arson investigation protocols, Petroleum Products: Forensic analysis of petrol, diesel, kerosene (BIS standards), adulteration detection.	<b>23</b>



<b>III</b>	<b>Drug Analysis &amp; Toxicology:</b> NDPS Act & Controlled Substances: Legal frameworks (NDPS Act 1985), precursor chemicals, clandestine labs, drug raids, Drug classification (narcotics, psychotropics), designer drugs, addiction mechanisms, Analytical Techniques: Presumptive tests (color tests, TLC), microcrystalline assays for opioids, cannabinoids, etc., Toxicology: Drug dependence, tolerance, and forensic case studies (e.g., overdose deaths).	<b>22</b>
<b>IV</b>	<b>Quality Systems &amp; Accreditation in Forensic Chemistry:</b> Introduction to Quality: Quality Assurance (QA), Quality Control (QC), Total Quality Management (TQM). Accreditation: Definitions, ISO history, ILAC/APLAC/ASCLD roles. Quality Protocols: Traceability, method validation, measurement uncertainty, equipment calibration/maintenance, Proficiency testing, internal/external audits, training (MRM).	<b>23</b>
<b>Total</b>		<b>90</b>

**Notional Credit Hours for the course = 30 x 4 = 90**

<b>Distribution of Credits</b>		
<b>Lectures/ Tutorial</b>	<b>Practicum</b>	<b>Experiential Learning</b>
90	0	30 Discussions, Presentations and Quiz, Case Solving

#### **Textbooks:**

1. Klaassen, C. D.,: Casarett and Doull's Toxicology: The Basic Science of Poisons, 5th ed, McGraw-Hill, 1995.
2. Budhiraja, R.D.: Elementary Pharmacology and Toxicology, Popular Prakashan, 2nd ed., 1999.
3. Brean S. Furniss Etal; A.I. Vogel Textbook of Practical Organic Chemistry, Addison Wesley Longman, Edinburg.

#### **Reference Books:**

1. Working Procedure Manual – Chemistry, Explosives and Narcotics, BPR&D Pub.
2. Silverman; Organic Chemistry of Drug Design & Drug Action, Elsevier Pub. New Delhi.
3. Verma, R. M: Analytical Chemistry – Theory and Practice, CBS Pub., 1994.

### **SEMESTER - II**

<b>Paper Sl. No.</b>	<b>Paper - 2</b>	<b>Scheme of Evaluation</b>	<b>Theory</b>
<b>Name of the Course</b>	Questioned Document and Dermatoglyphics	<b>L-T-P-C</b>	3-1-0-4
<b>Type of Course</b>	Core	<b>Credits Assigned</b>	4
<b>Paper Code</b>	FSC144C202	<b>Level of the Course</b>	500

**Course objective:** This course aims to develop expertise in analyzing questioned documents (e.g., forgery detection, handwriting analysis, tampering identification) and fingerprint evidence (pattern classification, ridge analysis, AFIS integration) through theoretical principles and practical techniques. Students will master forensic protocols for document examination, counterfeit detection, and fingerprint identification to support criminal investigations and legal proceedings with scientific accuracy.

<b>Course Outcome :</b> After successful completion of the course, student will be able to		
<b>CO</b>	<b>Course Outcome</b>	<b>Bloom's Taxonomy Level</b>
CO1	<b>recall</b> the foundational definitions, types of forgeries, principles of handwriting examination, and protocols for handling, packaging, and photographing questioned documents.	BT1
CO2	<b>explain</b> the methodologies for physical document matching, examination of secret writings/charred documents, and detection of counterfeit currency/passports/mechanical impressions.	BT2
CO3	<b>apply</b> fingerprint collection techniques and analytical methods to identify individuals.	BT3
CO4	<b>analyze</b> fingerprint classification systems to differentiate their structural frameworks, hierarchical patterns, and application in forensic databases.	BT4

<b>Module</b>	<b>Course content</b>	<b>Lectures</b>
<b>I</b>	<b>Questioned Document:</b> Definition, scope, nature and problems, care, handling and packaging of document evidence. Collection of writing standards: specimen and admitted. Forgeries and its types, Principles of handwriting examination, authorship identification, detection of alterations/tampering in documents, Photography of document exhibits.	<b>24</b>
<b>II</b>	<b>Document Examination:</b> Physical matching of Documents, Examination of secret writings and charred documents, Examination of counterfeit currency notes, passport, visa and other mechanical impressions.	<b>21</b>
<b>III</b>	<b>Fingerprint science:</b> Definition, History, development, Scope of Fingerprint science, Composition of sweat, Introduction to chanced prints: their search, development and collection procedure, Maintaining the fingerprint slips: rolled and plain prints. Identification of fingerprints: pattern analysis, ridge characteristics, comparison of fingerprints. Ridge tracing, Ridge counting, Photography of fingerprint exhibits.	<b>24</b>
<b>IV</b>	<b>Fingerprint classification techniques:</b> Single digit, 10-digit Henry classification, numerical value, symbol, primary classification, secondary classification, sub-secondary classification, final classification, key classification and major classification. NCIC classification. Introduction to	<b>21</b>

	FACTS and AFIS.	
<b>Total</b>		<b>90</b>

**Notional Credit Hours for the course = 30 x 4 = 120**

<b>Distribution of Credits</b>		
<b>Lectures/ Tutorial</b>	<b>Practicum</b>	<b>Experiential Learning</b>
90	0	30 Discussions, Presentations and Quiz, Case Solving

**Textbooks:**

1. Chatterjee S.K., Speculation in Finger print identification, Jantralekha, Printing Works, Kolkata.
2. Cowger, James F: Friction ridge skin: Comparison and Identification of Fingerprints; CRC Press, Boca Raton, New York.
3. Cook Nancy: Classifying fingerprints -Innovative learning publication MentoPark
4. Cossidy, M. J. Footwear Identification, Royal Canadian Mounted Police, Ontario, Canada.

**Reference Books:**

1. J A Seigel, P.J Saukoo and G C Knupfer; Encyclopedia of Forensic Sciences Vol. I, II and III, Acad.Press
2. Hillison, S; Dental Anthropology, Cambridge Univ. Press, UK.
3. Albert S. Osborn; Questioned Documents, Second Ed.; Universal Law Publishing, Delhi
4. Koppenhaver, K. (2010). Forensic Document Examination: Principles and Practice (1<sup>st</sup> Ed.).

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**SEMESTER - II**

<b>Paper Sl. No.</b>	<b>Paper - 3</b>	<b>Scheme of Evaluation</b>	<b>Practical</b>
<b>Name of the Course</b>	Forensic Chemistry and Toxicology (Practical)	<b>L-T-P-C</b>	0-0-8-4
<b>Type of Course</b>	Core	<b>Credits Assigned</b>	4
<b>Paper Code</b>	FSC144C213	<b>Level of the Course</b>	500

**Course objective:** This course aims to equip students with practical skills in analyzing explosives, ignitable residues, alcohols, petroleum products, plant/animal toxins, heavy metals, and narcotics using analytical techniques (TLC, UV-Vis, FTIR, color tests, microcrystalline assays). It emphasizes hands-on training in extraction, separation, and forensic identification of adulterants, toxins, and illicit substances for applications in criminal investigations, quality control, and regulatory compliance.

<b>Course Outcome :</b> After successful completion of the course, student will be able to
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<b>CO</b>	<b>Course Outcome</b>	<b>Bloom's Taxonomy Level</b>
CO1	<b>identify</b> the procedural steps for analyzing high explosives.	BT1
CO2	<b>understand</b> the principles of color tests.	BT2
CO3	<b>apply</b> analytical methods to identify plant poisons.	BT3
CO4	<b>analyze</b> chromatographic, spectroscopic, and chemical methods to differentiate Cannabis components and metallic poisons.	BT4

<b>Modules</b>	<b>Course content</b>	<b>Lectures</b>
<b>I</b>	1. Analysis of high explosives by TLC, UV, FTIR. 2. Extraction of ignitable liquid residues from various matrices. 3. Qualitative analysis of fire residues by TLC. 4. Preliminary & confirmatory examination of chemicals used in trap cases.	<b>22</b>
<b>II</b>	5. Analysis of methanol using colour test and TLC. 6. Analysis of ethanol using colour test and TLC. 7. Analysis of petroleum products using TLC 8. Detection of adulteration in petroleum using various methods.	<b>23</b>
<b>III</b>	9. Identification of common plant poisons oleander, dhatura, calotropis and ricin etc. by various analytical methods. 10. Extraction of heavy metals by conventional methods and analysis by color tests. 11. Extraction and identification of drugs/ toxicants from biological matrix and their detection. 12. Microcrystalline tests for narcotic drugs.	<b>22</b>
<b>IV</b>	13. Separation of Cannabis by TLC. 14. Separation of Cannabis by UV-Vis spectroscopy. 15. Separation of Cannabis by FTIR spectroscopy. 16. Extraction and identification of metallic poisons from viscera using Dry Ashing Method followed by Reinsch's test.	<b>23</b>
<b>Total</b>		<b>90</b>

**Notional Credit Hours for the course = 30 x 4 = 120**

<b>Distribution of Credits</b>		
<b>Lectures/ Tutorial</b>	<b>Practicum</b>	<b>Experiential Learning</b>
0	90	30 Discussions, Presentations and Quiz, Case Solving

**Textbooks:**

1. Curry: Analytical Methods in Human Toxicology, Part II, 1986.
2. Gupta, P.K. Fundamentals of Toxicology: Essential Concepts and Applications. India, Elsevier Science, 2016.
3. Casarett & Doll Toxicology: The Basic Science of poisons.

**Reference Books:**

1. Clark, E.G.C.: Isolation and identification of Drugs, 1966.
2. Curry, A.S.: Poison Detection in Human Organs, 1976.
3. Curry, A.S.: Advances in Forensic Chemical Toxicology, 1972.
4. Holfmann, F.G.: Handbook of Drug and Alcohol Abuse.

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**SEMESTER - II**

<b>Paper Sl. No.</b>	Paper - 4	<b>Scheme of Evaluation</b>	Practical
<b>Name of the Course</b>	Questioned Document and Dermatoglyphics (Practical)	<b>L-T-P-C</b>	0-0-8-4
<b>Type of Course</b>	Core	<b>Credits Assigned</b>	4
<b>Paper Code</b>	FSC144C214	<b>Level of the Course</b>	500

**Course objective:** This course aims to equip students with advanced skills in forensic document examination (handwriting analysis, signature forgery detection, ink/alteration identification) and fingerprint analysis (ridge characteristics, classification, latent print development). It emphasizes practical application of techniques (TLC, GC-MS, chemical methods) to authenticate currency, passports, and seals, ensuring compliance with legal and ethical standards in criminal investigations.

<b>Course Outcome :</b> After successful completion of the course, student will be able to		
<b>CO</b>	<b>Course Outcome</b>	<b>Bloom's Taxonomy Level</b>
CO1	<b>define</b> the principles of handwriting analysis and document examination.	BT1
CO2	<b>explain</b> the procedures for detecting mechanical/chemical erasures and analyzing intersecting stroke sequences.	BT2
CO3	<b>apply</b> fingerprint analysis techniques and latent print development methods to authenticate currency notes.	BT3
CO4	<b>analyze</b> security features in passports, seals/stamps, and ink composition.	BT4

<b>Module</b>	<b>Course content</b>	<b>Lectures</b>
<b>I</b>	1. Identification of Handwriting-general characteristics, fundamental divergences and individual characteristics. 2. Examination and Identification of Signature Forgeries. 3. To study the natural variations in handwriting written in different circumstances. 4. Examination of additions, alterations, and obliterations in the documents.	<b>22</b>
<b>II</b>	5. Examination of mechanical and chemical use of erasers on the documents. 6. Examination of sequence of intersecting strokes. 7. To take plain and rolled fingerprints and to identify the patterns. 8. To perform ridge tracing and ridge counting.	<b>23</b>
<b>III</b>	9. To identify ridge characteristics. 10. To classify and compare the fingerprints. 11. To develop latent fingerprints with powders, fuming and chemical methods. 12. Examination of currency notes.	<b>22</b>
<b>IV</b>	13. Examination of Passport. 14. Examination of Seals and Stamps Impressions. 15. Examination of ink by TLC. 16. Examination of ink by GCMS.	<b>23</b>
<b>Total</b>		<b>90</b>

**Notional Credit Hours for the course = 30 x 4 = 120**

<b>Distribution of Credits</b>		
<b>Lectures/ Tutorial</b>	<b>Practicum</b>	<b>Experiential Learning</b>
0	90	30 Discussions, Presentations and Quiz, Case Solving

**Textbooks:**

1. Albert S. Osborn; Questioned Documents, Second Ed.; Universal Law Publishing, Delhi.
2. Koppenhaver, K. (2010). Forensic Document Examination: Principles and Practice (1st Ed.).
3. Hilton, O. (1993). Scientific examination of questioned documents (1st ed.). Boca Raton: CRC Press.

**Reference Books:**

4. Kelly, J., & Lindblom, B. (2006). Scientific examination of questioned documents. Boca Raton, FL: CRC/Taylor & Francis.
5. Ellen, D. (2006). Scientific examination of documents. Boca Raton, FL: Taylor & Francis.
6. Huber, R., & Headrick, A. (1999). Handwriting identification (1st ed.). Boca Raton: CRC Press.

### SEMESTER – III

<b>Paper Sl. No.</b>	Paper - 1	<b>Scheme of Evaluation</b>	T&P
<b>Name of the Course</b>	Forensic Biology and Wildlife Forensics	<b>L-T-P-C</b>	3-1-0-4
<b>Type of Course</b>	Core	<b>Credits Assigned</b>	4
<b>Paper Code</b>	FSC144C301	<b>Level of the Course</b>	500

**Course objective:** This course aims to provide students with advanced knowledge of forensic biology, encompassing detailed serological and DNA analysis techniques critical for human identification. It further seeks to introduce the specialized domain of wildlife forensics, focusing on the application of forensic science principles to investigate crimes against wildlife, with a particular emphasis on the Indian legal framework and conservation efforts. Students will learn to analyze diverse biological samples and understand the scientific and legal challenges in both human and wildlife forensic contexts.

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Understand the principles of forensic biology, serology, and the identification and forensic significance of various biological evidence.	BT2
CO2	Apply advanced DNA typing methodologies (PCR, STRs, mtDNA, Y-STRs) for human identification and interpret complex DNA profiling results, including mixtures.	BT3
CO3	Analyze the Indian legal and ethical frameworks pertinent to wildlife protection and the application of forensic science in investigating wildlife crimes.	BT4
CO4	Evaluate and apply various forensic techniques for species identification, genetic analysis of non-human samples, and the examination of wildlife parts and products.	BT5

Module	Course content	Lectures Page 22
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<b>I</b>	<b>Fundamentals of Forensic Biology and Serology:</b> Forensic Biology: Scope, significance, and types of biological evidence; Forensic Serology: Nature, composition, collection, preservation, and forensic examination of blood, semen, saliva, urine, feces, and other physiological fluids; Presumptive and confirmatory tests for biological fluids; species of origin determination; Forensic examination of hair: morphology, species identification, and individual characteristics; Forensic examination of fibers: types, properties, and comparison; Introduction to Forensic Botany: Diatoms, pollen grains, wood, leaves, and their forensic significance.	<b>22</b>
<b>II</b>	<b>Forensic DNA Analysis:</b> DNA: Structure, function, and organization in humans; concept of DNA polymorphism; Principles of DNA extraction from various biological sources; DNA quantification methods and assessment of DNA quality; Polymerase Chain Reaction (PCR): Principles and applications in forensic science; Forensic DNA Typing: Short Tandem Repeats (STRs), Y-chromosome STRs (Y-STRs), mitochondrial DNA (mtDNA) analysis; Interpretation of DNA profiles: single source, mixtures, statistical evaluation using population databases; Recent advances in forensic DNA typing; Quality Assurance, Quality Control, and ethical considerations in forensic DNA laboratories.	<b>23</b>
<b>III</b>	<b>Introduction to Wildlife Forensics and Legal Framework:</b> Definition, history, scope, and importance of wildlife forensics; Common wildlife crimes in India: poaching, illegal hunting, trafficking of wildlife parts and products, habitat destruction; The Wildlife (Protection) Act, 1972: Schedules, offenses, penalties, and powers of authorities; Other relevant Indian legislation: Indian Forest Act, Biological Diversity Act, Prevention of Cruelty to Animals Act, and CITES implementation in India; Role of national and international agencies in wildlife crime control; Wildlife crime scene investigation: recognition, collection, packaging, preservation, and documentation of wildlife evidence.	<b>22</b>
<b>IV</b>	<b>Techniques in Wildlife Forensics:</b> Morphological identification of wildlife and their parts: bones, teeth, skin, fur, hair, feathers, scales, claws, horns, antlers, tusks; Microscopic examination of wildlife hair and feathers; Wildlife DNA Analysis: Sample collection from diverse sources; Species identification using DNA barcoding and other molecular markers; Individual identification and population genetics in wildlife cases; Geographical origin assignment of wildlife and wildlife products using molecular techniques; Forensic entomology in wildlife death investigations; Introduction to wildlife toxicology: common poisons and methods of detection; Case studies in Indian and international wildlife forensics.	<b>23</b>
	<b>Total</b>	<b>90</b>

**Notional Credit Hours for the course = 30 x 4 = 120**



Distribution of Credits		
Lectures/ Tutorial	Practicum	Experiential Learning
90	00	30 Discussions, Presentations and Quiz, Case Solving

#### Textbooks:

1. Saferstein, R. (Relevant Current Edition). *Criminalistics: An Introduction to Forensic Science*. Pearson.
2. Butler, J.M. (Relevant Current Edition). *Advanced Topics in Forensic DNA Typing: Methodology / Interpretation*. Academic Press / Elsevier.
3. Gunn, A. (Relevant Current Edition). *Essential Forensic Biology*. Wiley-Blackwell.
4. Huffman, J.E., & Wallace, J.R. (Eds.). (Relevant Current Edition). *Wildlife Forensics: Methods and Applications*. Wiley.
5. Linacre, A., & Tobe, S. (Eds.). (Relevant Current Edition). *Wildlife DNA Analysis: Applications in Forensic Science*. Wiley.

#### Reference Books:

1. Li, R. (Ed.). (Relevant Current Edition). *Forensic Biology*. CRC Press.
2. James, S.H., Nordby, J.J., & Bell, S. (Eds.). (Relevant Current Edition). *Forensic Science: An Introduction to Scientific and Investigative Techniques*. CRC Press.
3. Rivers, D.B., & Dahlem, G.A. (2022). *The Science of Forensic Entomology* (2nd ed.). Wiley-Blackwell.
4. Cooper, J.E., & Cooper, M.E. (Relevant Current Edition). *Wildlife Forensic Investigation: Principles and Practice*. CRC Press.
5. Relevant Indian Legal Acts: The Wildlife (Protection) Act, 1972; Indian Forest Act; Biological Diversity Act.

### SEMESTER – III

Paper Sl. No.	Paper - 2	Scheme of Evaluation	Theory
Name of the Course	Digital Forensics	L-T-P-C	3-1-0-4
Type of Course	Core	Credits Assigned	4
Paper Code	FSC144C302	Level of the Course	500

**Course objective:** This course aims to provide students with an in-depth understanding of the principles, methodologies, and tools used in digital forensics. It will cover the systematic process of

acquiring, preserving, analyzing, and presenting digital evidence from various sources, including computers, mobile devices, and networks. The course emphasizes hands-on skills, legal and ethical considerations, and the ability to conduct thorough digital investigations in compliance with established standards.

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Understand the fundamental principles of digital forensics, the digital forensic investigation process, and legal/ethical considerations.	BT2
CO2	Apply techniques for acquiring, preserving, and analyzing digital evidence from various operating systems (Windows, Linux, macOS) and storage media.	BT3
CO3	Analyze network traffic, logs, and cloud-based data to identify and investigate cyber incidents and security breaches.	BT4
CO4	Conduct forensic examinations of mobile devices (iOS, Android) to extract and analyze data.	BT4

Module	Course content	Lectures
<b>I</b>	<b>Fundamentals of Digital Forensics &amp; Investigation Process:</b> Digital Forensics: Definition, scope, history, and ethics; The Digital Forensic Investigation Process: Identification, Preservation, Collection (Acquisition), Examination, Analysis, and Reporting; Legal Aspects of Digital Forensics: Indian laws, admissibility of digital evidence, chain of custody; Understanding Digital Evidence: Types, characteristics, volatility (volatile and non-volatile data acquisition); Crime Scene Processing for Digital Evidence: Securing the scene, initial assessment, documentation, and handling of digital devices; Setting up a Digital Forensics Laboratory and understanding forensic tools.	<b>22</b>

<b>II</b>	<b>Computer Forensics: Operating Systems and File Systems:</b> Windows Forensics: File systems (FAT, NTFS), registry analysis, event logs, prefetch files, LNK files, jump lists, browser forensics, recycle bin analysis; Linux Forensics: File systems (ext2/3/4), log files, shell history, common artifacts; macOS Forensics: HFS+ and APFS file systems, system logs, user artifacts; Data Acquisition Techniques: Live vs. dead acquisition, creating forensic images, hardware and software write-blockers; File System Analysis: Structure, metadata, recovering deleted files, slack space analysis, file carving; Steganography and data hiding techniques.	<b>23</b>
<b>III</b>	<b>Network Forensics and Cloud Forensics:</b> Network Forensics: Principles, goals, and challenges. Network Traffic Analysis: Capturing and analyzing network packets, identifying protocols, and reconstructing network events. Log Analysis: Sources of network logs, correlation, and interpretation; Investigating Network Intrusions and Attacks; Introduction to Cloud Forensics: Challenges (jurisdiction, data volatility, multi-tenancy), cloud service models (IaaS, PaaS, SaaS); Acquiring and analyzing data from cloud environments; legal considerations in cloud investigations.	<b>22</b>
<b>IV</b>	<b>Mobile Device Forensics:</b> Mobile Device Forensics: Challenges, device types, operating systems (Android, iOS); Mobile Device Data Acquisition: Logical, file system, and physical acquisition methods; JTAG and chip-off techniques; Analysis of Mobile Device Data: Call logs, messages, contacts, application data, GPS data, Wi-Fi data, SIM card forensics; Introduction to Malware Forensics: Types of malware, static and dynamic analysis (overview); Digital Forensics Reporting and Expert Testimony: Structure of a forensic report, presenting findings, Daubert/Frye standards; Current Trends and Future Directions in Digital Forensics.	<b>23</b>
	<b>Total</b>	<b>90</b>

**Notional Credit Hours for the course = 30 x 4 = 120**

<b>Distribution of Credits</b>		
<b>Lectures/ Tutorial</b>	<b>Practicum</b>	<b>Experiential Learning</b>
90	00	30 Discussions, Presentations and Quiz, Case Solving

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ks:**

1. N

elson, B., Phillips, A., & Steuart, C. (Relevant Current Edition). *Guide to Computer Forensics*

*and Investigations*. Cengage Learning.

2. Johansen, G. (Relevant Current Edition). *Digital Forensics and Incident Response*. Packt Publishing.
3. Luttgens, J. T., Pepe, M., & Mandia, K. (Relevant Current Edition). *Incident Response & Computer Forensics*. McGraw-Hill.
4. Oettinger, W. (Relevant Current Edition). *Learn Mobile Forensics*. Packt Publishing.

#### Reference Books:

1. Carvey, H. (Relevant Current Edition). *Windows Forensic Analysis Toolkit*. Syngress. (or similar advanced Windows forensics book)
2. Casey, E. (Relevant Current Edition). *Digital Evidence and Computer Crime: Forensic Science, Computers, and the Internet*. Academic Press.
3. Easttom, C. (Relevant Current Edition). *An In-Depth Guide to Mobile Device Forensics*. CRC Press.
4. Relevant Indian Acts: Information Technology Act, 2000; Indian Evidence Act, 1872.

### SEMESTER – III

Paper Sl. No.	Paper - 3	Scheme of Evaluation	Practical
Name of the Course	Forensic Biology (Practical)	L-T-P-C	0-0-8-4
Type of Course	Core	Credits Assigned	4
Paper Code	FSC144C313	Level of the Course	500

**Course Objective:** To provide students with advanced hands-on training in the methodologies of forensic biology, focusing on the collection, preservation, examination, and analysis of diverse biological evidence. The course emphasizes proficiency in advanced serological techniques, comprehensive DNA analysis (extraction, quantification, amplification, and profiling), and the interpretation of complex biological data for legal applications.

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

CO	Course Outcome	Bloom's Taxonomy Level
CO1	Demonstrate proficiency in advanced laboratory safety protocols, quality assurance/quality control (QA/QC) measures, and meticulous evidence handling and documentation for biological samples.	BT3
CO2	Perform and interpret a range of presumptive and confirmatory	BT3, BT4

	serological tests for various human biological fluids and conduct species identification tests.	
CO3	Execute DNA extraction from diverse and challenging forensic samples, accurately quantify DNA, and perform PCR amplification of STR loci.	BT3
CO4	Generate and analyze STR profiles using capillary electrophoresis and genotyping software, and interpret complex DNA profiles including mixtures and degraded samples, applying appropriate statistical calculations.	BT4, BT5

Module	Course content	Lectures
<b>I</b>	<ol style="list-style-type: none"> <li>1. Presumptive and confirmatory tests for blood on various substrates.</li> <li>2. Species of origin testing for bloodstains.</li> <li>3. Microscopic examination of human hair for forensic characterization and comparison.</li> </ol>	<b>22</b>
<b>II</b>	<ol style="list-style-type: none"> <li>4. Presumptive and confirmatory tests for saliva.</li> <li>5. DNA extraction from various standard biological evidence: fresh and dried bloodstains and saliva.</li> <li>6. DNA extraction from challenging forensic samples: hair roots and old degraded stains.</li> </ol>	<b>23</b>
<b>III</b>	<ol style="list-style-type: none"> <li>7. DNA quantification using UV Spectrophotometry and Real-Time PCR (qPCR) methods.</li> <li>8. Assessment of DNA quality and purity (gel electrophoresis for integrity check).</li> <li>9. PCR amplification of autosomal Short Tandem Repeat (STR) loci using commercial multiplex kits, including setting up reactions with positive and negative controls.</li> </ol>	<b>22</b>
<b>IV</b>	<ol style="list-style-type: none"> <li>10. Analysis and interpretation of single-source STR profiles.</li> <li>11. Analysis of DNA mixtures (identification of major/minor contributors, calculation of Likelihood Ratios).</li> <li>12. Mock casework: Integrated analysis of simulated biological evidence from a complex crime scene scenario, encompassing evidence documentation, serological screening, DNA analysis, interpretation of results, and preparation of a comprehensive forensic report.</li> </ol>	<b>23</b>

<b>Total</b>	<b>90</b>
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**Notional Credit Hours for the course = 30 x 4 = 120**

<b>Distribution of Credits</b>		
<b>Lectures/ Tutorial</b>	<b>Practicum</b>	<b>Experiential Learning</b>
00	90	30 Discussions, Presentations and Quiz, Case Solving

#### **Textbooks:**

- Butler, J.M. (Relevant Current Edition). *Advanced Topics in Forensic DNA Typing: Methodology*. Academic Press / Elsevier.
- Butler, J.M. (Relevant Current Edition). *Advanced Topics in Forensic DNA Typing: Interpretation*. Academic Press / Elsevier.
- Li, R. (Ed.). (Relevant Current Edition). *Forensic Biology* (e.g., 2nd or 3rd ed.). CRC Press.
- Saferstein, R. (Relevant Current Edition). *Criminalistics: An Introduction to Forensic Science* (e.g., 13th ed.). Pearson.
- McClintock, J. T. (2014). *Forensic Analysis of Biological Evidence: A Laboratory Guide for Serological and DNA Typing*. CRC Press.

#### **Reference Books:**

- Gunn, A. (Relevant Current Edition). *Essential Forensic Biology* (e.g., 3rd ed.). Wiley-Blackwell.
- Goodwin, W., Linacre, A., & Hadi, S. (Relevant Current Edition). *An Introduction to Forensic Genetics*. Wiley.
- James, S. H., Nordby, J. J., & Bell, S. (Eds.). (Relevant Current Edition). *Forensic Science: An Introduction to Scientific and Investigative Techniques* (e.g., 5th ed.). CRC Press.

### SEMESTER – IV

<b>Paper Sl. No.</b>	Paper - 1	<b>Scheme of Evaluation</b>	Theory
<b>Name of the Course</b>	Forensic Medicine and Anthropology	<b>L-T-P-C</b>	3-1-0-4
<b>Type of Course</b>	Core	<b>Credits Assigned</b>	4
<b>Paper Code</b>	FSC144C401	<b>Level of the Course</b>	500

**Course objective:** This course aims to provide students with an advanced and comprehensive understanding of the principles and applications of forensic medicine and forensic anthropology in the context of legal investigations, with a specific focus on the Indian medico-legal system. The course will cover the examination of death, injuries, asphyxia, and the identification of human remains, integrating medical knowledge with anthropological techniques for establishing identity and interpreting trauma.

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

<b>CO</b>	<b>Course Outcome</b>	<b>Bloom's Taxonomy Level</b>
CO1	Understand the fundamental principles of forensic medicine, medical jurisprudence, and the legal procedures relevant to death investigation in India. <sup>1</sup>	BT2
CO2	Analyze and interpret various types of injuries, including mechanical, thermal, and firearm injuries, and understand the medico-legal aspects of asphyxial deaths. <sup>3</sup>	BT4
CO3	Apply knowledge of human osteology and dental anthropology for the identification of human skeletal remains, including the determination of age, sex, stature, and ancestry. <sup>4</sup>	BT3
CO4	Evaluate skeletal trauma to differentiate between antemortem, perimortem, and postmortem injuries and understand the principles of forensic taphonomy. <sup>6</sup>	BT5

<b>Module</b>	<b>Course content</b>	<b>Lectures</b>
<b>I</b>	<b>Fundamentals of Forensic Medicine &amp; Legal Procedures (India</b>	<b>15</b>

	<p><b>Focus):</b> Forensic Medicine: Definition, scope, history, and development in India; Medical Jurisprudence: Indian legal system; Medical ethics, professional responsibilities, and consent in medical practice; Death: Definition, types (somatic, cellular, brain-stem death), modes of death; Signs of death: Immediate, early, and late post-mortem changes. Post-Mortem Examination: Objectives, types, procedures, exhumation, legal requirements, and documentation in India.</p>	
<b>II</b>	<p><b>Forensic Traumatology &amp; Asphyxial Deaths:</b> Injuries (Wounds): Definition, classification. Medico-legal aspects of mechanical injuries: Abrasions, contusions (bruises), lacerations, incised wounds, stab wounds; Regional Injuries: Medico-legal aspects of injuries to the head, neck, chest, abdomen, and limbs; Firearm Injuries: Types of firearms, mechanism of injury, examination of firearm wounds; Asphyxial Deaths: Definition, classification. Hanging, strangulation (ligature and manual), suffocation, drowning – types, causes, post-mortem findings; Deaths due to heat, cold, electricity, and lightning.</p>	<b>15</b>
<b>III</b>	<p><b>Fundamentals of Forensic Anthropology:</b> Introduction to Forensic Anthropology: Definition, scope, history, and development in India; Human Osteology: Detailed study of the human skeleton, identification of individual bones and their features, siding of bones; Establishment of Identity from Skeletal Remains: Determination of Age: From eruption and wear of teeth, ossification of bones, epiphyseal union, cranial suture closure, pubic symphysis changes, and microscopic methods; Determination of Sex: From pelvis, skull, and other skeletal indicators; Determination of Stature: From long bones using regression formulae and other methods; Determination of Race/Ancestry: From skull and other skeletal features; Dental Anthropology: Basics of dental anatomy, notation systems, age estimation from teeth, and forensic significance of dental records; Recovery of Human Remains.</p>	<b>15</b>
<b>IV</b>	<p><b>Advanced Forensic Anthropology &amp; Medico-legal Applications:</b> Analysis of Skeletal Trauma: Differentiation between antemortem, perimortem, and postmortem injuries; Identification of trauma caused by blunt force, sharp force, and projectiles on bones; Forensic Taphonomy: Study of postmortem processes affecting human remains, including decomposition stages in different environments, animal scavenging, and environmental effects on bone; Facial Reconstruction and Superimposition: Principles and techniques; Mass Disaster Victim Identification (DVI): Role of the forensic anthropologist, protocols, and challenges; Application of advanced imaging techniques in</p>	<b>15</b>



	forensic anthropology; Forensic anthropological report writing: Structure, content, and interpretation of findings.	
<b>Total</b>		<b>60</b>

**Notional Credit Hours for the course = 30 x 4 = 120**

<b>Distribution of Credits</b>		
<b>Lectures/ Tutorial</b>	<b>Practicum</b>	<b>Experiential Learning</b>
90	00	30 Discussions, Presentations and Quiz, Case Solving

### **Textbooks:**

1. Reddy, K.S. Narayan & Murty, O.P. (Relevant Current Edition). *The Essentials of Forensic Medicine and Toxicology*. Jaypee Brothers Medical Publishers.
2. Bardale, Rajesh. (Relevant Current Edition). *Principles of Forensic Medicine & Toxicology*. Jaypee Brothers Medical Publishers.
3. Byers, Steven N. (Relevant Current Edition). *Introduction to Forensic Anthropology*. Routledge / Pearson.
4. Langley, N.R., & Tersigni-Tarrant, M.T.A. (Eds.). (Relevant Current Edition). *Forensic Anthropology: A Comprehensive Introduction*. CRC Press.
5. Pillay, V.V. (Relevant Current Edition). *Textbook of Forensic Medicine and Toxicology*. Paras Medical Publisher.

### **Reference Books:**

1. Modi, Rai Bahadur Jaising P. (Revised by Mathiharan, K., & Patnaik, A.K.). (Relevant Current Edition). *Modi's Medical Jurisprudence and Toxicology*. LexisNexis.
2. DiMaio, Vincent J.M., & DiMaio, D. (Relevant Current Edition). *Forensic Pathology*. CRC Press.
3. Krogman, W.M., & İşcan, M.Y. (Relevant Current Edition). *The Human Skeleton in Forensic Medicine*. Charles C Thomas Publisher.
4. Scheuer, L., & Black, S. (Relevant Current Edition). *Developmental Juvenile Osteology*. Academic Press.
5. Burns, Karen Ramey. (Relevant Current Edition). *Forensic Anthropology Training Manual*. Pearson.
6. Aggrawal, Anil. (Relevant Current Edition). *Textbook of Forensic Medicine and Toxicology*. APC Books.
7. Relevant Indian Legal Acts: The Indian Penal Code, 1860; The Code of Criminal Procedure, 1973; The Indian Evidence Act, 1872.

## SEMESTER – IV

<b>Paper Sl. No.</b>	<b>Paper - 2</b>	<b>Scheme of Evaluation</b>	<b>Theory</b>
<b>Name of the Course</b>	<b>Forensic Psychology</b>	<b>L-T-P-C</b>	<b>3-1-0-4</b>
<b>Type of Course</b>	Core	<b>Credits Assigned</b>	<b>4</b>
<b>Paper Code</b>	FSC144C402	<b>Level of the Course</b>	<b>500</b>

**Course objective:** This course aims to provide students with an advanced understanding of the application of psychological principles and methods within the legal and criminal justice system, with a specific focus on the Indian context. The course will cover theories of criminal behavior, psychological aspects of criminal investigation, forensic psychological assessment techniques, the role of forensic psychologists in legal proceedings, and ethical considerations pertinent to the field in India.

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

<b>CO</b>	<b>Course Outcome</b>	<b>Bloom's Taxonomy Level</b>
CO1	Understand core concepts, historical development (India & global), ethical guidelines, and the legal framework for forensic psychology in India.	BT2
CO2	Analyze psychological theories of criminal behavior, psychopathology relevant to crime, and critically evaluate offender profiling techniques.	BT4
CO3	Evaluate psychological principles in criminal investigations, including eyewitness testimony, investigative interviewing, deception detection, and victimology.	BT5
CO4	Apply forensic psychological assessment methods for issues like competency to stand trial, insanity defense, and risk assessment within the Indian legal system.	BT3

<b>Module</b>	<b>Course content</b>	<b>Lectures</b>
<b>I</b>	<b>Foundations of Forensic Psychology and Indian Legal Context:</b> Definition, scope, history, and subfields of Forensic Psychology; Interface between Psychology and Law; Roles, responsibilities, and functions of forensic psychologists in the Indian criminal justice	<b>22</b>

	system; Ethical principles and dilemmas in forensic psychology practice in India; Professional guidelines; Indian Legal Framework: Relevant provisions of the Indian Penal Code (IPC), Code of Criminal Procedure (CrPC), Indian Evidence Act, 1872, Mental Healthcare Act, 2017, and Juvenile Justice (Care and Protection of Children) Act, 2015; Landmark judgments in India related to forensic psychology.	
<b>II</b>	<b>Psychology of Criminality and Offender Assessment:</b> Psychological Theories of Criminal Behavior: Psychoanalytic, behavioral, cognitive, social learning, trait theories, and biopsychosocial perspectives; Psychopathology and Crime: Personality disorders, mood disorders, psychotic disorders, and their link to criminal behavior; Offender Profiling: Inductive vs. Deductive approaches; FBI's organized/ disorganized dichotomy; Investigative Psychology (Canter); Geographic Profiling; Assumptions, utility, and limitations; Psychology of Specific Offenses: Serial crimes, sexual offenses, violent extremism/terrorism, white-collar crimes; Juvenile Delinquency: Psychological factors, assessment, and intervention strategies within the Indian Juvenile Justice System.	<b>23</b>
<b>III</b>	<b>Psychology in Investigation and Victimology:</b> Psychology of Eyewitness Testimony: Memory processes (encoding, storage, retrieval); Factors influencing eyewitness accuracy; Techniques for enhancing recall; Investigative Interviewing and Interrogation: Principles of effective interviewing (PEACE model overview); Psychological tactics in interrogation; False confessions – risk factors and consequences; Detection of Deception: Verbal and non-verbal cues; Scientific validity and limitations of polygraph, narco-analysis, and brain-based deception detection methods in the Indian legal context; Victimology: Psychological impact of crime on victims; Victim needs and rights; Role of forensic psychologists in victim assistance and support programs in India; Police Psychology: Stress, burnout, and coping mechanisms in law enforcement.	<b>22</b>
<b>IV</b>	<b>Forensic Psychological Assessment in Legal Settings and Correctional Psychology:</b> Assessment of Competency to Stand Trial: Legal standards in India; Clinical assessment methods; Malingering detection; Assessment of Insanity: Legal standards in India; Assessment procedures; Diminished responsibility; Violence Risk Assessment: Actuarial, structured professional judgment, and anamnestic approaches; Communicating risk to courts; Forensic Psychology in Civil Matters (Overview): Child custody evaluations, assessment of psychological injury in personal injury cases; The Forensic Psychologist as an Expert Witness: Preparation of forensic psychological reports; Admissibility of psychological evidence in Indian courts; Courtroom testimony skills; Ethical challenges in expert testimony; Correctional Psychology: Psychological assessment and interventions for offenders in correctional settings; Rehabilitation and reintegration programs in India.	<b>23</b>

	<b>Total</b>	<b>90</b>
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**Notional Credit Hours for the course = 30 x 4 = 120**

<b>Distribution of Credits</b>		
<b>Lectures/ Tutorial</b>	<b>Practicum</b>	<b>Experiential Learning</b>
90	00	30 Discussions, Presentations and Quiz, Case Solving

### **Textbooks:**

1. Bartol, C. R., & Bartol, A. M. (Relevant Current Edition, e.g., 6th or 7th Ed.). *Introduction to Forensic Psychology: Research and Application*. Sage Publications.
2. Veeraraghavan, V. (Relevant Current Edition). *Handbook of Forensic Psychology*. (Indian Author).
3. Gavin, H. (Relevant Current Edition). *Criminological and Forensic Psychology*. Sage Publications.

### **Reference Books:**

1. Weiner, I. B., & Hess, A. K. (Eds.). (Relevant Current Edition, e.g., 3rd or 4th Ed.). *Handbook of Forensic Psychology*. Wiley.
2. Costanzo, M., & Krauss, D. (Relevant Current Edition). *Forensic and Legal Psychology: Psychological Science Applied to Law*. Worth Publishers.
3. Canter, D. (Relevant Current Edition). *Forensic Psychology: A Very Short Introduction*. Oxford University Press.
4. Sharma, B.R. (Relevant Current Edition). *Forensic Science in Criminal Investigation and Trials*. Universal Law Publishing.
5. Relevant Indian Legal Acts: The Indian Penal Code, 1860; The Code of Criminal Procedure, 1973; The Indian Evidence Act, 1872; The Mental Healthcare Act, 2017; The Juvenile Justice (Care and Protection of Children) Act, 2015.
6. Journals: *Indian Journal of Criminology & Criminalistics*, *Journal of Indian Academy of Forensic Medicine, Law and Human Behavior* (AP-LS Journal), *Psychology, Public Policy, and Law*.

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