M.Sc. Forensic Science

4 Semesters (2 years) PG Program

Faculty of Science

2024-2025

School of Studies in Forensic Science

Pt. Ravi Shankar Shukla University, Raipur (C. G.)

M.Sc. Forensic Science

The MSc Forensic Science course is designed to provide advanced knowledge and practical training in applying science to solve crimes and ensure justice. It covers a wide range of specialized branches, such as forensic biology, which focuses on analyzing DNA, blood and other biological evidence; forensic chemistry, which deals with substances like drugs, toxins and trace materials; and forensic toxicology, which examines the impact of chemicals and poisons on the human body. Other fascinating areas include forensic anthropology, which identifies human remains; digital forensics, which investigates cybercrimes and digital evidence; and ballistics, which studies firearms and ammunitions to link them to criminal activities. This multidisciplinary course is perfect for those passionate about uncovering the truth and making a real difference in the justice system, offering excellent carrier prospects in forensic labs, law enforcement, and investigative agencies.Practical skills are also a central focus, with rigorous training in laboratory techniques, including microscopy, toxicological analysis, chemical methods, questioned document examination, and the use of advanced technologies such as DNA analysis, protein sequencing, and next-generation sequencing. Throughout the program, students are encouraged to approach evidence analysis without bias, ensuring that conclusions are based solely on scientific findings. The MSc course also emphasizes the importance of teamwork and collaboration, particularly in laboratory settings, where students work together to acquire, analyze, and interpret forensic data. This collaborative environment mirrors real-world forensic investigations, where professionals from different disciplines often work together to solve complex cases.

Program Outcomes (PO):

Upon successful completion of the Master of Science in Forensic Science program, students will be able to:

PO-1	**Knowledge:**Provides comprehensive knowledge across forensic disciplines, equipping graduates with the expertise to apply scientific principles in criminal investigations and evidence analysis, while understanding legal and ethical considerations.
PO-2	**Critical Thinking and Reasoning:** Forensic Science fosters critical thinking and reasoning by training graduates to analyze evidence objectively, evaluate multiple perspectives, and make informed decisions. The program emphasizes logical problem-solving, helping

	graduates assess forensic data, identify patterns, and draw sound conclusions in complex investigative scenarios.
PO-3	**Problem Solving:** Forensic Science sharpens problem-solving skills by teaching graduates to apply scientific methods to complex criminal cases, using analytical tools to identify evidence, develop hypotheses, and draw evidence-based conclusions for effective investigations.
PO-4	**Advanced Analytical and Computational Skills:** Develops advanced analytical and computational skills, equipping graduates with the ability to use sophisticated tools and techniques for analyzing forensic evidence. This includes DNA profiling, toxicology, and digital forensics, with a focus on accurate data interpretation and the use of computational software to support precise conclusions.
PO-5	**Effective Communication:** Forensic Science focuses on effective communication, teaching graduates to clearly present complex forensic findings to both scientific and non-scientific audiences. This includes writing detailed reports, presenting in court, and communicating with legal and law enforcement professionals, ensuring forensic evidence is conveyed accurately and effectively in legal contexts.
PO-6	**Interdisciplinary Interaction**: Forensic Science promotes interdisciplinary interaction by blending knowledge from biology, chemistry, law, criminal justice, and technology. It encourages collaboration across these fields, helping graduates approach forensic investigations holistically. This interdisciplinary approach equips them to work effectively with professionals from diverse sectors, ensuring a comprehensive and integrated contribution to criminal justice and forensic science.
PO-7	**Self-directed and Life-long Learning**: Encourages self-directed, lifelong learning by enhancing critical thinking and research skills. Graduates are empowered to stay updated with advancements in forensic science, adapt to new technologies, and pursue ongoing education or research to remain at the forefront of the field throughout their careers.
PO-8	**Effective Citizenship**: Forensic Science fosters effective citizenship by equipping graduates with the knowledge to contribute to society through their expertise. The program emphasizes justice, fairness, and the rule of law, encouraging responsible use of forensic skills in crime-solving and public safety. Graduates are prepared to advocate for the ethical use of forensic evidence, supporting the integrity of legal processes and maintaining public trust in law enforcement and the justice system.

PO-9	**Ethics:** Emphasizes ethics in forensic practice, preparing graduates to handle sensitive cases with integrity and professionalism. The program ensures a strong understanding of ethical principles like evidence accuracy, transparency, chain of custody, and confidentiality. This focus equips graduates to contribute responsibly to the criminal justice system and maintain public trust in forensic science.
PO-10	**Further Education or Employment:** Forensic Science prepares graduates for advanced education and diverse careers in forensic science and criminal justice. It equips them with technical, analytical, and legal skills for roles like forensic analyst, crime scene investigator, and toxicologist. Graduates can pursue further research, contribute to the criminal justice system, and explore global career opportunities, while upholding ethical practices in handling sensitive cases.
PO-11	**Global Perspective**: Equips graduates with global expertise to tackle complex crimes using interdisciplinary skills in biology, chemistry, and digital science. Emphasizing ethical practices, cross-border collaboration, and advanced technologies, it addresses challenges like cybercrimes, terrorism, and environmental crimes. The program fosters research innovation and prepares graduates to work with international agencies, contribute to global justice systems, and shape policies to enhance global security and justice.

Program Specific Outcomes (PSO): At the end of the program, the students will be able to:

PSO-1	Understand the fundamental principles of forensic science, including its various sub-disciplines (e.g., forensic biology, toxicology, digital forensics) and their applications in solving criminal cases. Recognize the interdisciplinary connections between forensic science and related fields such as law, chemistry, and biology.
PSO-2	Apply forensic science principles and methodologies to analyze crime scene evidence, identify forensic issues, and solve complex cases. Utilize appropriate scientific techniques to evaluate physical, biological, and digital evidence in forensic investigations.
PSO-3	conduct research in forensic science, including designing and executing experiments or field investigations, collecting and analyzing data using specialized software tools, and interpreting findings in the context of forensic theories. Present research outcomes accurately and contribute to the advancement of forensic science.

PSO-4	Demonstrate professionalism, ethical behavior, and integrity in forensic practice. Adhere to legal and ethical standards in evidence handling, maintain chain of custody, and identify and address potential ethical challenges related to forensic investigations.
PSO-5	Qualify for national-level examinations such as NET, and pursue career opportunities in law enforcement, forensic laboratories, legal agencies, or research institutions. Contribute to the development of forensic science practices, and explore opportunities for establishing NGOs or independent forensic consultancy.

SoS in Forensic Science

M.Sc. Forensic Science

Program Structure

Program (M. Sc. Forensic Science)	Core		Discipline Specific Elective Course (DSE)		Total		Value Added Course (VAC)		Generic Elective Course (GEC)	
Semester	**Paper**	**Credit**	**Paper**	**Credit**	**Paper**	**Credit**	**Paper**	**Credit**	**Paper**	**Credit**
I	06	24	-	-	**06**	**24**	01	02	-	-
II	08	24	01	02	**09**	**26**	-	-	01	02
III	08	24	01	02	**09**	**26**	-	-	01	02
IV	03	20	02	04	**05**	**24**	01	02	-	-
Total	**25**	**92**	**04**	**08**	**29**	**100**	**02**	**04**	**02**	**04**

Semester	Specification of Course	No. of Courses (T+P)		Credits
I	Core	04	02	24
	Elective	-	-	
II	Core	04	04	26
	Elective	01		
III	Core	04	04	26
	Elective	01		
IV	Core	00	03	24
	Elective	02		
Total		**16**	**13**	**100**
Additional Courses (Qualifying in nature for students admitted in School of Studies only)				
		No. of Courses		Credits
I & IV	**Skill Enhancement/Value Added Courses:** (Offered to the PG students of SoS in Forensic Science)	**02**		**04**
II &III	**Generic Elective Courses:** (Offered to PG students of other Departments/ SoS only)	**02**		**04**

SoS in Forensic Science

M.Sc. Forensic Science

Program Structure

Semester- I

Semester	Course Nature	Course Code	Course Title	Course Type (T/P)	Hrs/ Week (L+T+P)	Credits	Marks		
							CIA	ESE	Total
Semester-I	Core	FST 110	Forensic Science & Criminology	T	5+1	5	30	70	100
	Core	FST 120	Crime Scene management	T	5+1	5	30	70	100
	Core	FST 130	Instrumental analysis in Forensic sciences	T	5+1	5	30	70	100
	Core	FST 140	Forensic Biology and Serology	T	5+1	5	30	70	100
	Core	FSL 150	Practicals Based on Crime Scene management	P	4	2	30	70	100
	Core	FSL 160	Practicals Based on Forensic Biology and Serology	P	4	2	30	70	100
Total				**4/2**	**20+4+8**	**24**	**180**	**420**	**600**

Skill Enhancement / Value Added Courses: Offered to the PG students of SoS in Forensic Science

Semester	Course Nature	Course Code	Course Title	Course Type (T/P)	Hrs/ Week (L+T+P)	Credits	Marks		
							CIA	ESE	Total
Semester 1	VAC	FST 170	Indian knowledge system in Forensic Science	T	2	2	30	70	100

Semester- II

Semester	Course Nature	Course Code	Course Title	Course Type (T/P)	Hrs/ Week (L+T+P)	Credits	Marks		
							CIA	ESE	Total
Semester-II	Core	FST 210	Questioned Documents	T	4+1	4	30	70	100
	Core	FST220	Forensic Genetics and DNA Profiling	T	4+1	4	30	70	100
	Core	FST 230	Forensic Chemistry and Toxicology	T	4+1	4	30	70	100
	Core	FST 240	Research Methodology and Ethics	T	4+1	4	30	70	100
	Elective-1 (Select any one)	FST251	Nano Forensics	T	2+1	2	30	70	100
		FST 252	Forensic Psychiatry	T	2+1	2	30	70	100
		FST 253	Wildlife Forensics and Forensic Entomology	T	2+1	2	30	70	100
	Core	FSL 260	Practical's Based on Questioned Document	P	4	2	30	70	100
	Core	FSL 270	Practical's Based on Forensic Chemistry and Toxicology	P	4	2	30	70	100
	Core	FSL 280	Practical's Based on Genetics and DNA Profiling	p	4	2	30	70	100
	Core	FSL 290	Practical's Based Forensic Psychiatry	P	4	2	30	70	100
			Total	**5/4**	**18+5+16**	**26**	**270**	**630**	**900**

Generic Elective Courses: Offered to the PG students of other SoS only

Semester	Course Nature	Course Code	Course Title	Course Type (T/P)	Hrs/ Week (L+T+P)	Credits	Marks		
							CIA	ESE	Total
Semester II	Generic Elective	FST 300	Elementary Forensic& Crime Scene Management	T	2	2	30	70	100

Semester- III

Semester	Course Nature	Course Code	Course Title	Course Type (T/P)	Hrs/ Week (L+T+P)	Credits	Marks		
							CIA	ESE	Total
Semester-III	Core	FST 310	Computer Forensics and Digital investigations	T	4+1	4	30	70	100
	Core	FST320	Forensic Ballistics and Physics	T	4+1	4	30	70	100
	Core	FST 330	Forensic Medicine	T	4+1	4	30	70	100
	Core	FST 340	Forensic Anthropology	T	4+1	4	30	70	100
	Elective-1 (Select any one)	FST351	Recent Advance in Forensic Chemistry	T	2+1	2	30	70	100
		FST 352	Forensic Genomics, Proteomics and Bioinformatics	T	2+1	2	30	70	100
		FST 353	Forensic Microbiology and Immunology	T	2+1	2	30	70	100
	Core	FSL360	Practical's Based on Computer Forensics and Digital investigations	P	4	2	30	70	100
	Core	FSL 370	Practical's Based on Forensic Ballistics and Physics	P	4	2	30	70	100
	Core	FSL 380	Practical's Based on Forensic Anthropology	P	4	2	30	70	100
	Core	FSL 390	Practical's Based on Forensic Genomics, Proteomics and Bioinformatics	P	4	2	30	70	100
Total				**5/4**	**18+5+16**	**26**	**270**	**630**	**900**

Generic Elective Course: Offered to the **PG students of other SoS only**.

Semester	Course Nature	Course Code	Course Title	Course Type (T/P)	Hrs/ Week (L+T+P)	Credits	Marks		
							CIA	ESE	Total
Semester III	Generic Elective	FST 400	Forensic Dermatoglyphics & Questioned Document	T	2	2	30	70	100

Semester- IV

	Course Nature	Course Code	Course Title	Course Type (T/P)	Hrs/ Week (L+T+P)	Credits	Marks		
							CIA	ESE	Total
Semester-IV	Elective -1 (Select any one)	FST 411	Recent Advancement in Forensic Photography	T	4+1	2	30	70	100
		FST412	Recent Advancement in Forensic Biology	T	4+1	2	30	70	100
		FST 413	Recent Advancement in Forensic Serology & Immunology	T	4+1	2	30	70	100
	Elective -2 (Select any one)	FST 421	Recent Advancement in Forensic Physics	T	4+1	2	30	70	100
		FST422	Recent Advancement in Forensic Ballistics	T	4+1	2	30	70	100
		FST 423	Recent Advancement in Questioned Documents and Fingerprints	T	4+1		30	70	100
	Core	FSL 430	Practicals Based on Recent Advancement in Forensic Biology	P	4	2	30	70	100
	Core	FSL 440	Practicals Based on Recent Advancement in Questioned Documents and Fingerprints	P	4	2	30	70	100
	Core	FSL 450	DISSERTATION +Viva	P	24	12+4	60	140	200
			Total	**2/3**	**8+2+32**	**24**	**180**	**420**	**600**

Skill Enhancement / Value Added Course: Offered to the PG students of SoS in Forensic Science

Semester	Course Nature	Course Code	Course Title	Course Type (T/P)	Hrs/ Week (L+T+P)	Credits	Marks		
							CIA	ESE	Total
Semester IV	SEC	FST 460	Mobile & Network Forensic	T	2	2	30	70	100

M.Sc. (Forensic Science) Semester-I

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	I
Course Code	**Course Title**		**Course Type**
FST 110	Forensic Science and Criminology		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
5	5	1	-
Maximum Marks	**CIA**		**ESE**
100	30		70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to provide a guide in the basic, fundamental and detailed concepts of Forensic Science and Criminology. This course is to introduce to the students the basic knowledge of history, scope, basic principle of forensic science and organizational structure of forensic laboratory. The students also gained the knowledge about section of IPC, CrPC, criminal offences and police organizational structure.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Understand the organizational structure of Forensic science laboratory, police organization and laboratory management.	R
2	Understand the criminal offences, laws, section of IPC and CrPC and procedure of investigation.	U
3	Understand the crime and concept of criminology, and their theories.	Ap
4	Understand the Police Science and punishments for crimes.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:Forensic Science & Criminology

PO	POs											PSO				
CO	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	3	3	1	1	3	3	2	2	2
CO2	3	-	1	-	2	3	3	3	3	1	1	3	2	2	1	2
CO3	3	-	1	-	2	3	3	3	3	1	1	3	3	3	1	2
CO4	3	-	1	-	2	3	3	3	3	1	1	3	2	1	1	2

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 110- Forensic Science and Criminology

Unit No.	Topics	No. of Lectures	CO No.
I	Definition, Scope, History and Development, Nature need and Functions of Forensic science, Basic Principles of Forensic Science, Modus Operandi, Corpus Delicti, Organizational structure of Forensic Science Laboratories at State and Central level, FPB, NICFS, CDTS (Central Detective Training School), NCRB, Ethics in Forensic Science, Duties of Forensic Scientist, Laboratory management system and Importance of accreditation in forensic science laboratories.		I
II	General idea to IPC offences against person, offences against property, IEA (Sec 32, 45, 46, 47, 57, 58, 60, 65, 65B, 73, 135, 136, 137, 159), CrPC – Introduction, definitions, FIR, NCR, FIR and it's evidentiary value, Complaint, bailable and Non-bailable offenses, powers of courts, Summons, warrant, relevant sections (CrPC Sec 154, 155, 174,175, 291, 292, 293), and its relevant sections related to Forensic Science, Procedure for Investigation, Bail ,Pre Trial Proceedings, Trial, Parole, Remand, Rights of accused and Victim		II
III	Definition & scope, crime & Criminal, Introduction to classification of Offences, theories of Crime causation Brief introduction to schools of Criminology; White Collar crime, Organized Crimes, Economic crimes, Cybercrimes, Crime against children and women.		III
IV	Police Organizations at State and Central Level, Introduction to CBI, BPR&D. Interpol its Role and functions. Introduction to Punishment, theories and types.		IV

Recommended Readings:

- Sharma, B.R.: Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad, 1974.
- Lundquest & Curry: Forensic Science, VolItoIV,1963, Charls C. Thomas, Illinosis, USA
- Saferstein : Forensic Science Handbook, VolI, II& III, Prentice Hall Inc. USA
- Saferstein: Criminalistics, 1976, Prentice Hall Inc. USA
- N. Gilbert; Criminal Investigation; Third edition, Macmillan Publishing Company, 1993
- Kirk: Criminal Investigation, 1953, Interscience Publisher Inc. New York
- Bruce A. Arrigo (2000) Introduction to Forensic Psychology Academic Press, London

M.Sc. (Forensic Science) Semester-I

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	I
Course Code	**Course Title**		**Course Type**
FST 120	Crime Scene Management		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
5	5	1	-
Maximum Marks	**CIA**		**ESE**
100	30		70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to provide a guide in managing Crime Scene investigation. This course enriches students with knowledge of Collection of various type of evidences, search methods, crime scene documentation and reconstruction of crime scenes**.**

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Understanding the procedure of evidence collection from crime scene, evidence packaging, transportation, type of evidence, Crime scene tools and equipment's.	R
2	Understanding the Digital evidence, methods of search and approaches for crime scene processing.	U
3	Understanding crime scene documentation, forensic photography, sketching, interpretation and reconstruction of crime scene.	Ap
4	Understanding the crime scene of fire, arson, explosion, Biological sample identification, sexual offences and collection and identification of narcotic drugs.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course: Crime Scene Management

PO	POs											PSO				
CO	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	3	3	1	1	3	3	3	1	2
CO2	3	-	1	-	2	3	3	3	3	1	1	3	2	3	1	2
CO3	3	-	1	-	2	3	3	3	3	1	1	3	3	3	1	2
CO4	3	-	1	-	2	3	3	3	3	1	1	3	2	3	1	2

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 120- Crime Scene Management

Unit No.	Topics	No. of Lectures	CO No.
I	Introduction to Crime scene investigation Definition and Types of Crime scene, Principles of Forensic science, Experts team Composition, Role of First responding officer, Physical Evidences. Introduction, Definition, Types and their collection, Preservation, packaging, transporting and forwarding, various techniques used for handling, Physical and trace evidences, Crime scene tool kits and equipment's etc. Ethics in Crime Scene Investigation		I
II	Digital evidence: Introduction, Definition types and their collection, preservation, packaging, transporting, storage and forwarding, Methodological approach to processing the crime scene. Processing a crime scene, Searching the scene-Types of Searches, Zone Search: Ever Widening, Circle Strip Search, and Grid Search, Indoor searches and outdoor searches		II
III	Crime Scene Documentation, Crime Scene Photography, Videography, sketching and mapping. Chain of custody, interpreting a crime scene, Reconstruction of a crime scene.		III
IV	Crime scene management of crime scene investigation in the cases of fire and Arson, Explosions, Burglary and Theft, Hit & run, Sexual offences, Death investigation. Use of Forensic light sources for detection of biological evidences at scene of crime scene, Presumptive test for identifying narcotic drugs, blood, semen, explosive and Gunshot residue sets. Computer graphics, Electronic Detectors ND Magnetic locators.		IV

Recommended Readings:

- Siegel, J. A., Saukko, P. J. And Knupfer, G.C., Encyclopedia of Forensic Sciences, Academic
- Publishers, London
- Kirk,P.L. Fire Investigations, John Wiley and Sons
- Saferstein : Forensic Science Handbook, VolI, II& III, Prentice Hall Inc. USA
- Anita.Y. Wonder; Bloodstain Pattern Elsevier, London
- Barry,A.J.Fisher.; Techniques of CrimeSceneInvestigation,6thEdition Ed, C.R.C Press NY(2003)
- Kirk: Criminal Investigation, 1953, Interscience Publisher Inc. New York
- Mordby, JDeed Reckoning; The Art of Forensic Detection, CRC Pre LLC(2000)

M.Sc. (Forensic Science) Semester-I

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	I
Course Code	**Course Title**		**Course Type**
FST 130	Instrumental Analysis in Forensic Science		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
5	5	1	-
Maximum Marks	**CIA**		**ESE**
100	30		70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is introduced students to principles and application of analytical chemistry, basic concept of spectroscopy its instrumentation, chromatography, spectrophotometry, microscopy and DNA forensics techniques.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Understanding the about basic concept of analytical chemistry, spectroscopic techniques and its application in forensic science.	R
2	Understanding to separate, analyses the biological and chemical evidence of crime scene samples using chromatographic techniques	U
3	Understanding of advance spectrophotometric and thermal analysis techniques used for analysis of the crime scene samples.	Ap
4	Understanding DNA forensic technology, microscopy and its application in forensic science.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO	POs											PSO				
CO	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	3	3	1	1	3	3	3	1	2
CO2	3	-	1	-	2	3	3	3	3	1	1	3	2	3	1	2
CO3	3	-	1	-	2	3	3	3	3	1	1	3	3	3	1	2
CO4	3	-	1	-	2	3	3	3	3	1	1	3	2	3	1	2

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 130- Instrumental analysis in Forensic Sciences

Unit No.	Topics	No. of Lectures	CO No.
I	Concept of analytical forensic chemistry, qualitative and quantitative analysis. Basic concepts of Atomic spectra, Energy levels and Molecular spectra, Electromagnetic spectrum, Sources of radiation, Interaction of Energy and Matter, Introduction to spectroscopy, Basic Principle involve in various spectroscopic techniques, calibration methods, UV-Visible spectroscopy: Basic concepts, Principles and Forensic applications of UV-visible spectroscopy, Lambert-Beer law and its deviations, fluorescence spectroscopy, Luminometry, InfraRed (IR) and Raman spectroscopy, Fourier transform InfraRed (FTIR) spectrophotometer, Surface Plasma Resonance (SPR)., Nuclear Magnetic Resonance spectroscopy		I
II	Chromatography: General introduction to chromatography, Basic concepts, principles, performance parameter and functions. Thin Layer chromatography (TLC), Affinity Chromatography, Gel Exclusion Chromatography, Ion Exchange chromatography, High Performance Liquid Chromatography (HPLC), Gas Chromatography (GC)and High-performance Thin layer Chromatography (HPTLC). Detector and its types.		II
III	Spectrophotometry: General introduction, Basic concepts, Principles and Forensic application of Atomic Absorption Spectrophotometry (AAS), Atomic emission Spectrometry (AES), Inductive coupled plasma (ICP), X-ray diffraction (XRD), X-ray Photoelectron spectroscopy (XPS), Mass spectrometry. Differential Scanning Calorimeter (DSC), Differential Thermal Analyzer (DTA), Neutron Activation Analysis (NAA)		III
IV	DNA sequencing methods, Capillary electrophoresis, Genetic Analyzer, Polymerase Chain Reaction, Real Time PCR, Microarray, Karyotyping and FISH, Basic principles of Microscopy, Comparison microscope, Stereoscopic microscope, Fluorescent Microscopy, Infrared Microscope, Scanning Electron Microscope (SEM)&Transmission Electron Microscope (TEM)		IV

Recommended Readings:

- Gunther,H.,NMRSpectroscopy.BasicPrinciples,ConceptsandApplicationsinChemistry,2nd Edn, Wiley, Chichester, 1995
- Davis, R.and Frearson,M. (1987)Mass Spectrometry, Wiley, London Alan Gunn Essential forensic biology Jhon. Wiley
- Siegel, J. A., Saukko, P. J. And Knupfer, G.C., Encyclopedia of Forensic Sciences, Academic Publishers, London
- .Kirk,P.L. Fire Investigations, John Wiley and Sons
- Saferstein : Forensic Science Handbook, VolI, II& III, Prentice Hall Inc. USA
- Anita.Y. Wonder; Bloodstain Pattern Elsevier, London
- Gardnes & Snustd; Principles of Genetics 6th Ed., John Wiley &Sons
- Barbara Wheeler Lori J. Wilson,P ractical Forensic Microscopy: A Laboratory Manual.
- BryanL.William & KeithWilson; Principles &Techniques of Practical Biochemistry, Edward Arnold Pub. (1975)
- Keith Wilson &John Walker; Practical Biochemistry- Principles&Techniques,5thEd., Cambridge University Press

M.Sc. (Forensic Science) Semester-I

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	I
Course Code	**Course Title**		**Course Type**
FST 140	Forensic Biology & Serology		Core
Credit	**Hours Per Week (L-T-P)**		
	L	**T**	**P**
5	5	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce students with concept of forensic uses of body fluid like blood, urine and saliva, basics of biochemistry, serological techniques and wildlife forensics.

Course Outcomes (CO): Forensic Biology and Serology

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will able to learn the types, nature and importance of biological evidences..	R
2	Students will able to learn biochemical property of biological evidence.	U
3	Students will able to learn basics and practical aspects of various serological and biological techniques applied in identification and preservation of biological evidences	Ap
4	Students will able to learn the various aspects of wildlife forensic and entomology	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO	POs											PSO				
CO	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	3	3	1	1	3	3	2	2	2
CO2	3	-	1	-	2	3	3	3	3	1	1	3	2	2	1	2
CO3	3	-	1	-	2	3	3	3	3	1	1	3	3	3	1	2
CO4	3	-	1	-	2	3	3	3	3	1	1	3	2	1	1	2

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 140- Forensic Biology and Serology

Unit No.	Topics	No. of Lectures	CO No.
I	Introduction to Forensic Biology: Biological fluids of forensic significance (Blood, Semen, Saliva, Sweat, Urine, Vitreous humour, Amniotic fluid, Milk, Fecal matter). Cellular component of Blood. Hair and its forensic importance. Blood grouping systems (ABO, Rh, MN, Duffy, Kidd, Kell, Lutheran and P system). Biology of pollen and its forensic significance. Microbes of forensic importance.		I
II	Forensic Biochemistry: pH, Buffer. General Introduction of Biomolecules (Structure & Function). Antigen, Antibody & Lectins. Introduction to Enzyme & Hormones. Identification (Presumptive and confirmatory) of evidences of biological origin. Biochemical markers of Forensic significance.		II
III	Collection and preservation of biological evidence. Antigen-antibody interaction (Agglutination, Precipitation) and serological techniques based up on it (ELISA, RIA, Complement fixation, Immuno diffusion). Electrophoresis (SDS-PAGE, Agarose Gel, Immuno-electrophoresis, Isoelectric Focusing). Species identification & Blood typing (Wet & Dry). Blood pattern analysis (Blood stain characteristics, types, documentation) & its application in forensic investigation.		III
IV	Wildlife Forensic: Recovering evidence at poaching scenes; Illegal wildlife trade, Species identification, Protected and endangered species of animals and plants; Sanctuaries and their importance; Relevant provision of wild life and environmental act; Types of wildlife crimes, Wildlife artefacts (Bones, skin, fur, hair, nails, blood, feather, etc.).Insects of forensic importance; collection of entomological evidence during legal investigations, entomological samples(from the body, during autopsy, from buried remains from enclosed structures & aquatic habitats). Factors that influence insect succession on carrion, molecular methods for forensic entomology.		IV

Recommended Readings:

- Robertson,J.(1996):Forensic Examination of Hair. Taylor and Francis, USA.
- Modi,J.K.: Medical Jurisprudence and Toxicology, N. M. Tripathi Pvt. Ltd.
- Fraser,RobertsJ.A(1965):An introduction to Medical Genetics.
- Chatterjee,C.C-(1975): Human Physiology.
- Boorman,K. E: Blood Group Serology, Churchill, and Lincolin, P. J.(1988)
- Race,R.R.and Sangar, R. Blood Groups in Man. BlackwellScientific,Oxford.
- Saferstein,R.(1982):Science Handbook, Vol. I, II and III, Prentice Hall,
- Barris,H.andHopkinson,D.A.(1976):HandbookofEnzyme,Electrophoresis,Elsevier,North,Holland, NewYork.
- Gilblet,E.(1969):Marker's in Human Blood, Davis, Pennsylvania.
- Culliford, B. E. (1971), the examination and Typing of Blood Stains, US Dept. of Justice, Washington.
- Chowdhuri, S.(1971):Forensic Biology, BPR&D, Govt. of India.
- Dunsford, I. and Bowley,C.(1967):Blood Grouping Techniques, Oliver & Boyd, London.
- Eckert,W.G.&James, S.H.(1989): Interpretation of Blood Stain, Evidence, Elsevaier, NewYork.
- Coyle,H.M, Forensic Botany, CRC Press Working procedure manual: Biology/Serology; DFS,New Delhi.

M.Sc. (Forensic Science) Semester-I

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	I
Course Code	**Course Title**		**Course Type**
FST 150	Practicals based on Crime Scene management		Core
Credit	**Hours Per Week (L-T-P)**		
	L	**T**	**P**
5			5
Maximum Marks	**CIA**		**ESE**
100	30		70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce students with hands on training in crime scene investigation, collection, preservation and transportation of evidences and reconstruction of crime scene.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will able to learn about crime scene photography, physical evidence searching and collection of fingerprints and impression evidences	R
2	Students will able to learn about analysis of blood strain pattern and fire pattern	U
3	Students will able to learn about lifting of prints, impression evidences from crime scene	Ap
4	Students will able to learn about Crime Scene reconstruction collection, packaging, preservation and transportation of evidences	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO	POs											PSO				
CO	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	3	3	1	1	3	3	2	2	2
CO2	3	-	1	-	2	3	3	3	3	1	1	3	2	2	1	2
CO3	3	-	1	-	2	3	3	3	3	1	1	3	3	3	1	2
CO4	3	-	1	-	2	3	3	3	3	1	1	3	2	1	1	2

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FSL 150- Practical's based on Crime Scene management

Unit No.	Topics	No. of Lectures	CO No.
I	• Evaluation of Crime scene and photographs • Searching of physical evidence at crime scene. • Collection of evidence with individual characteristics: (1) Fingerprints (2) Tire tracks and foot impressions		I
II	• Analysis of pattern –Blood stain pattern, Fire pattern • Lifting of prints and impressions by caste and replicas.		II
III	• Sole prints comparison and their lifting from the scene of crime. • Collection, packing and preservation of biological evidences		III
IV	• Reconstruction of crime scene • Preparation of report of the examination.		IV

Recommended Readings:

- Siegel, J. A., Saukko, P. J. And Knupfer, G.C., Encyclopedia of Forensic Sciences, Academic
- Publishers, London
- Kirk,P.L. Fire Investigations, John Wiley and Sons
- Saferstein : Forensic Science Handbook, VolI, II& III, Prentice Hall Inc. USA
- Anita.Y. Wonder; Bloodstain Pattern Elsevier, London
- Barry,A.J.Fisher.; Techniques of CrimeSceneInvestigation,6thEdition Ed, C.R.C Press NY(2003)
- Kirk: Criminal Investigation, 1953, Interscience Publisher Inc. New York
- Mordby, JDeed Reckoning; The Art of Forensic Detection, CRC Pre LLC(2000)

M.Sc. (Forensic Science) Semester-I

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	I
Course Code	**Course Title**		**Course Type**
FSL 160	Practicals based on Forensic Biology & Serology		Core
Credit	**Hours Per Week (L-T-P)**		
	L	**T**	**P**
02	-	-	02
Maximum Marks	**CIA**		**ESE**
100	30		70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce students with hands on training in Blood cell analysis, blood grouping, presumptive and confirmatory test, immunodiffusion and blood pattern analysis.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will able to learn the types, nature and importance of biological evidences..	R
2	Students will able to learn biochemical property of biological evidence.	U
3	Students will able to learn basics and practical aspects of various serological and biological techniques applied in identification and preservation of biological evidences	Ap
4	Students will able to learn the various aspects of wildlife forensic and entomology	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO	POs											PSO				
CO	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	3	3	1	1	3	3	2	2	2
CO2	3	-	1	-	2	3	3	3	3	1	1	3	2	2	1	2
CO3	3	-	1	-	2	3	3	3	3	1	1	3	3	3	1	2
CO4	3	-	1	-	2	3	3	3	3	1	1	3	2	1	1	2

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FSL 160- Practical's based on Forensic Biology & Serology

Unit No.	Topics	No. of Lectures	CO No.
I	• PBMC isolation and cell counting by hemocytometer. • ABO blood grouping. • Blood pattern analysis.		I
II	• Presumptive and Confirmatory test of semen. • Presumptive and Confirmatory test of blood. • Starch iodine test for Saliva.		II
III	• Immunodiffusion techniques • Forensic Report writing.		III
IV	• Identification of developmental stage of housefly. • Age estimation of plant by analysis of annual ring.		IV

Recommended Readings:

- Forensic Hematology: A Primer for Forensic Scientists" by K. B. Pandya
- Cell Culture Techniques" by Jennifer L. Gowan
- Practical Hemocytometer and Cell Counting Techniques" by David S. T. Lee
- Forensic Medicine and Toxicology" by C.K. Sushil
- Human Blood Groups" by David Carleton
- Forensic Blood Grouping and DNA Typing" by H. N. Kumar
- Forensic Science: An Introduction to Scientific and Investigative Techniques" by Stuart H. James
- Forensic Biology" by Richard Li
- Forensic Science: From the Crime Scene to the Crime Lab" by Richard Saferstein
- Introduction to Forensic DNA Evidence for Criminal Justice Professionals" by John M. Butler

M.Sc. (Forensic Science) Semester-I

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	I
Course Code	**Course Title**		**Course Type**
FST 170	Indian Knowledge System in Forensic Science		VAC
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

These learning objectives aim to develop a comprehensive understanding of the intersections between traditional Indian wisdom and contemporary forensic science, emphasizing the role of ancient knowledge in modern-day applications.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	students will be able to understand the criminal justice systems of ancient India as described in texts like *Manusmriti*, *Arthashastra*, and *Yajnavalkya Smriti*. Students will also be able to critically analyze ancient Indian methods of crime detection and justice delivery.	R
2	Understanding how traditional Ayurvedic principles were applied in postmortem analysis and how this ancient knowledge can be integrated with modern forensic toxicology practices to enhance criminal investigations.	U
3	enable students to understand traditional Indian approaches to criminal psychology, including the concepts of *manas* (mind) and *buddhi* (intellect), and their role in understanding criminal motives and behavior, developing an appreciation for the interplay between cultural practices and criminal psychology in forensic science.	Ap
4	Iearn about ancient Indian knowledge of environmental elements such as soil, water, and natural resources, and how this was applied in forensic investigations, particularly in cases of poisoning or environmental crime.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	3	1	1	1	3	3	2	3	3
CO2	3	-	1	-	2	3	3	3	1	1	1	3	3	2	3	3
CO3	3	-	1	-	2	3	3	3	1	1	1	3	3	2	3	3
CO4	3	-	1	-	2	3	3	3	1	1	1	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 170- Indian Knowledge System in Forensic Science

Unit No.	Topics	No. of Lectures	CO No.
I	Criminal Investigation in Ancient India Ancient Indian legal texts i.e., Manusmriti, Arthashastra, and Yajnavalkya Smriti guidelines for investigating crimes, identifying culprits, and delivering justice. Arthashastra & Kautilya espionage and surveillance techniques		I
II	Application of Ayurveda in Forensic Science Toxicology (Vishachikitsa): various poisons (plant, animal, and mineral origins) and their symptoms, treatments, and effects. Postmortem Analysis: in Sushruta Samhita.		II
III	Cultural Practices and Criminal Psychology Forensic psychology. Traditional methods of understanding human behaviour, motives, and intentions		III
IV	Environmental Forensic at Ancient India: Ancient Indian knowledge of soil, water, and environmental elements often played a role in understanding crimes (e.g., poisoning of water sources) Trace contaminants and toxins.		IV

Recommended Readings:

- Manusmriti" (English Translation by G. Buhler)
- Arthashastra" by Kautilya (translated by L.N. Rangarajan)
- Yajnavalkya Smriti" (English Translation by P.V. Kane)
- The Science of War and Peace: Kautilya's Arthashastra" by Kautilya
- Sushruta Samhita" (English Translation by Kunjalal Bhishagratna)
- Toxicology in Ayurveda" by Dr. Umesh S. Thakur
- Ayurvedic Toxicology" by Dr. Vaidya
- Forensic Medicine and Toxicology" by Dr. Suresh Sharma
- Indian Forensic Medicine and Toxicology" by V.V. Pillay
- Forensic Psychology: Crime, Justice, and Therapy" by David Canter
- Psychology in Indian Culture" by Dr. S. S. Bhat
- Indian Psychology, Vol. 1-3" by R. C. Mishra
- Environmental Studies: From Crisis to Cure" by R. Rajagopalan
- Vedic Ecology: Practical Wisdom for Surviving the 21st Century" by David Frawley
- Indian Environmental Law and Policy" by R. D. Aggarwal
- Environmental Toxicology: Biological and Health Effects of Pollutants" by Ronald A. Hites

M.Sc. (Forensic Science) Semester-II

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	II
Course Code	**Course Title**		**Course Type**
FST 210	Questioned Documents and Fingerprints		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
04	04	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce students with principle of questioned documents, classification, handwriting identification, analysis of forged documents, fingerprints development and identification and tools used in questioned documents.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will able to learn the importance of examining questioned documents and Fingerprint examination in crime cases. The importance of detecting frauds and forgeries by analyzing questioned documents.	R
2	Students will able to learn the Fundamentals of fingerprints analysis and comparison of Fingerprints for Identification Purpose	U
3	Students will able to learn Natural variations and fundamental divergences in handwritings. Examination of counterfeit Indian currency notes, passports, visas and stamp papers, seal, rubber & other mechanical impressions.	Ap
4	Students will able to learn different tools and techniques used development of latent fingerprint on Crime Scene.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	2	3	2	1	3	3	2	2	2
CO2	3	-	1	-	2	3	3	2	3	2	1	3	2	2	1	2
CO3	3	-	1	-	2	3	3	2	3	2	1	3	3	3	1	2
CO4	3	-	1	-	2	3	3	2	3	2	1	3	2	1	1	2

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 210 - Questioned Documents and Fingerprints

Unit No.	Topics	No. of Lectures	CO No.
I	Nature and problems of Document examination, Classification of documents, Types of Forensic Documents; Collection of questioned Documents, Specimen and Requested handwriting, handling, preservation, marking and forwarding of documents to the laboratory; Writing instruments and their characteristics. Characteristic features in Handwriting: Principles of handwriting Identification, Comparison, Class and Individual Characteristic of Handwriting, Factors affecting hand writing.		I
II	Forgery, Types of Forgery, Examination of Forgery, Examination of Signature characteristics, Age determination of documents, Alterations in Documents, Examination of Paper & Ink, Examination of typed documents, Examination of Seal, rubber & other mechanical impressions, Handling and examination of charred documents, Examination of Forged currency notes. Basic tools needed for Forensic document examination, Photography of documents, Principle and Forensic significance of Video Spectral comparator (VSC), Electrostatic detection apparatus (ESDA). Disguised, Indented and secrete writings, Anonymous letters.		II
III	History and development of finger prints, Structure of ridged skin, Composition of Sweat Classification of finger Prints, pattern types, classification of Fingerprints (Primary to key classification), Ridge Counting, Ridge Tracing, and Minutiae Examination, Methods of taking fingerprint from living person: Rolled & Plain Searching of finger print evidence on crime scene.		III
IV	Chance Finger Prints: Conventional methods of development of latent finger prints, Development of Latent fingerprint: Physical, Chemical and Fuming method, Metal Deposition Techniques, Systematic approach to latent print processing, preserving and lifting of finger prints; Photography of Finger Prints, comparison of finger prints. Automatic Finger Print Identification system (AFIS), Expert evidence. Admissibility of Fingerprint, Admissibility of Fingerprint.		IV

Recommended Readings:

- Hilton; O. Scientific Examination of Questioned Documents, Elsevier, NY
- Albert S. Osborn; Questioned Documents, 2nd Ed., Universal Law Pub., Delhi
- WilsonR. Harrison; Suspect Documents Their Scientific Examination, Universal Law Pub.
- Hardless H.R; Disputed Documents, Handwriting and Thumbs–Print identification, profusely illustrated, Law Book, Allahabad
- Morris Ron N. Forensic Handwriting Identification; Academic Press, London.
- RoyA Huber, A.M. Headrick; Handwriting Identification-Facts and Fundamental, CRC Press
- Laboratory working procedure manual, Documents DFS, New Delhi, 2005
- J.E. Cowger, Friction Ridge Skin, CRC Press, Boca Raton (1983).
- D.A. Ashbaugh, Quantitative-Qualitative Friction Ridge Analysis, CRC Press, Boca Raton
- C. Champod, C. Lennard, P. Margot an M. Stoilovic, Fingerprints and other Ridge Skin Impressions, CRC Press, Boca Raton (2004).
- Lee and Gaensleen's, Advances in Fingerprint Technology, 3rd Edition, R.S. Ramotowski (Ed.), CRC Press, Boca Raton (2013).

M.Sc. (Forensic Science) Semester-II

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	II
Course Code	**Course Title**		**Course Type**
FST 220	Forensic Genetics and DNA profiling		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
04	04	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce students with concept of genetic material, physical properties of DNA, role of DNA in biological process, molecular biology of cells, forensic genetics, DNA profiling marker concept and its analysis methods, DNA technology application in crime investigation.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will able to learn the basic molecular biology of cell and its forensic application	R
2	Students will able to learn offspring inherit genetic traits from their parents, dominant, recessive and sex-linked genes and its mapping.	U
3	Students will able to learn basic concept of DNA fingerprinting, DNA profile interpretation, evaluation, DNA database, population genetics and its application in forensics.	Ap
4	Students will able to learn the DNA fingerprinting techniques, statistical assessment of STRs, personal identification and its application wildlife, child swapping, DVI etc.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO	POs											PSO				
CO	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	2	1	3	1	3	3	1	2	3	2	2	3	2	2	3
CO2	3	2	1	3	1	3	3	1	2	3	2	3	2	2	2	3
CO3	3	2	1	3	1	3	3	1	2	3	2	2	3	3	2	2
CO4	3	2	1	3	1	3	3	1	2	3	2	3	2	1	1	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 220 - Forensic Genetics & DNA Profiling

Unit No.	Topics	No. of Lectures	CO No.
I	An Introduction to Genetic Material, Structure of DNA, denaturation and renaturation of DNA, DNA binding proteins, factors affecting DNA stability, DNA Damage & repair, Chemical nature of DNA, Replication of DNA in prokaryotes and eukaryotes, genetic code, degeneracy and universality of genetic code, transcription and translation machinery.		I
II	Elements of human genetics: Introduction, heritability, human genetic variations, human chromosomes, Mendelian inheritances: Dominant inheritance, recessive inheritance, sex-linked inheritances, polymorphic traits; Heritable human diseases; Metabolic/molecular basis and detection of inherited disease, gene mapping; Genetic markers and their forensic significance. Molecular Biology Techniques: Basic principle of gene cloning and DNA analysis, cloning vectors-Plasmids and Bacteriophages, Genetic Manipulations, Gene cloning, Enzymes used in DNA manipulations- Nucleases, Ligases, polymerases, DNA modifying enzymes, Restriction Enzymes, DNA extraction from Plasmids, bacterial cells and animal cells, DNA sequencing, Gene Libraries construction, Colony Hybridization, Nick translation, Expression of Genes. Gene cloning and DNA analysis in Forensic Science.		II
III	Biological evidence- Sources collection, characterization and storage; DNA extraction and Quantification; General principles of DNA extraction and quantification; Basic concept of sequence variation-VNTRs, STRs, Mini STRs, SNPs. Detection techniques-RFLP, PCR amplifications, Y-STR, Mitochondrial DNA Evaluation of results, frequency estimate calculations and interpretation, Allele frequency determination, Match probability – Database		III
IV	STR Profiling: Structure of STR loci; The development of STR multiplexes; Detection of STR polymorphisms; Interpretation of result; Assessment of STR profiles: Stutter peaks. Sp. Pull-up; Degraded DNA; Statistical Assessment of STR profiles; estimating the frequencies of STR profiles. History of DNA profiling applications in disputed paternity cases, child swapping, missing person's identity, civil immigration, limitations of DNA profiling, Analysis of SNP, DNA chip technology Microarrays Cell free DNA, Use and application of DNA typing in wildlife investigations.		IV

Recommended Readings:

- Saferstein, Richard, Hand book of forensics science, Vol.I, II, (Ed.) Prentice hall, Eaglewood cliffs, NJ;
- William Goodwin, Adrian Linacre, Sibtehadi; An Introduction to Forensic Genetics John wiley & Son's Ltd, UK
- Coyle, H. (Ed.) Non-human DNA typing, International forensic science and investigation series, CRC Press, Bocaraton.
- Linacre,A.(Ed.) Forensic science in wildlife investigations, International forensic science and investigation Series, CRC Press, Boca Raton.
- Bruce budowle, Steven.Schutzer, Rogerg. Breeze And Paul S. Keim Microbial Forensics

- Niels Morling, Handbook of Forensic Genetics (Forensic Science And Medicine)Humana Press.
- John M. Butler FORENSIC DNA TYPING, Second edition: Biology, Technology, And genetics of STR Markers Elsevier Academic Press.

M.Sc. (Forensic Science) Semester-II

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	II
Course Code	**Course Title**		**Course Type**
FST 230	Forensic Chemistry and Toxicology		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
04	04	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce students about abused drugs, anabolic steroid, liquor and its adulteration, arson investigation, explosives examination, plant, animal and chemical poisons and its mode of action.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Student will able know about basic knowledge of forensic chemistry and toxicology.	R
2	They will learn about various drugs and their abuse in the society.	U
3	They will also learn how to investigate an arson case and various analytical method used for the analysis of petrol, diesel, edible oils and other fuels.	Ap
4	They will learn about various poisons, their classification, extraction methods, isolation and their identification.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	2	1	2	1	3	2	1	3	2	3	3	3	2	2	2
CO2	3	2	1	2	1	3	2	1	3	2	3	2	2	2	1	1
CO3	3	2	1	2	1	3	2	1	3	2	3	3	3	3	1	2
CO4	3	2	1	2	1	3	2	1	3	2	3	2	2	1	3	2

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 230 - Forensic Chemistry and Toxicology

Unit No.	Topics	No. of Lectures	CO No.
I	Forensic chemistry Definition and scope, Introduction to Narcotic drugs, Depressants, stimulants, andHallucinogens their Active components and method of analysis, Designer Drugs & Anabolic steroids,Analytical methods of analysis of IMFL, Country and Illicit liquor, Denatured spirits and theiranalysis.		I
II	Fire and Arson investigation- Methods of flammable oil residues detection from debris; Detection ofadulteration in Petrol and Diesel, edible oils, Examination of chemicals used in trap cases, Analysis ofmetals in cheating cases, Explosives: Introduction, classification and various methods of analysis ofExplosives.		II
III	Definition and scope, Poisons–Definition and Classification. Methods of isolation of poison fromViscera, Collection and Preservation of Viscera and other relevant materials, Analysis of ethyl alcohol and methyl alcohol in biological fluids.		III
IV	Extraction methods of poisons from viscera, blood and urine. Isolation and identification of PlantPoisons, opium and its derivatives, Benzodiazepine tranquilizers, Metallic Poison, Insecticides andPesticides. Basic concepts of Poisonous Mushrooms, Poisonous fungi, Food Poisoning, Commonvegetable abortificiants, Animal poison, Snake venom.		IV

Recommended Readings:

- Khan, JaVed I., Ho, Mat H. Analytical Methods in Forensic Chemistry. New York:Working
- Procedure Manua Chemistry/Toxicology/Explosives/Narcotics, DFS Pub. New Delhi
- Kennedy, Thomas J., Christian, Jr., Donnell Basic Principles of Forensic Chemistry, Springer
- Saferestein, Criminalistics: An Introduction to Forensic Science. Prentice Hall
- Maudham.B.et.al; Vogel's Textbook of Quantitative Chemical. Analysis, Longman
- John D. DeHaan ; Kirk's Fire Investigation, Prentice Hall Eaglewood Cliffs, N.J
- Yinon J; Modern Methods & Application in Analysis of Explosives, John Wiley.
- C.A. Watson; Official and standardized Methods of Analysis. Royal Society of Chemistry, UK.
- Goutam, M. P. and Goutam S Analysis of Plant Poison, Selective & Scientific Books, New Delhi.
- Feigl; Spot Test in Organic Analysis, Elsevier Pub., New Delhi.
- Curry A.S; Analytical Methods in Human Toxicology, Part II, CRC Press Ohio
- Clark, E.G.C.; Isolation and Identification of Drugs, Vol I&II, Academic Press, Sunshine I; Year book of Toxicology, CRC Press Series, USA
- Michael J. Deverlanko et al: Hand Book of Toxicology CRC Press, USA.
- Parikh C.K; Text Book of Medical Jurisprudence Forensic Medicines and Toxicology. CBS Pub. New Delhi.

M.Sc. (Forensic Science) Semester-II

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	II
Course Code	**Course Title**		**Course Type**
FST 240	Research Methodology and Ethics		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
04	04	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce students about research in forensic science, statistical analysis of research data, use framework of these methodologies for understanding effective lab practices and scientific communication, research publication ethics.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Give background on history of forensic science, emphasizing methodologies used to do research, use framework of these methodologies for understanding effective lab practices and scientific communication and appreciate scientific ethics.	R
2	Understanding the statistical methods used in scientific data evaluation.	U
3	Understand history and methodologies of scientific research, applying these to recent published papers.	Ap
4	Understand and practice scientific reading, writing and presentations; Appreciate scientific ethics through case studies.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	3	3	2	2	3	3	1	3	3	1	3	2	3	3	3
CO2	3	3	3	2	2	3	3	1	3	3	1	3	3	2	3	3
CO3	3	3	3	2	2	3	3	1	3	3	1	3	3	2	2	3
CO4	3	3	3	2	2	3	3	1	3	3	1	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 240 –Research Methodology and Ethics

Unit No.	Topics	No. of Lectures	CO No.
I	Elements of a Quality Management System: Quality, Total Quality, Quality assurance, Quality control Quality system. Quality Planning, Quality Audit: Internal and External Audit & MRM, History and development of ISO, Terminology of NABL. Benefits of ISO9000 series of standards. ISO9001 Requirement.		I
II	Sampling: sampling procedures (random and non-random), sampling statistics, Physical state, homogenization, size and hazards in sampling, Significance of statistics in forensic science. Basic concepts of frequency distribution, measure of central values - Mean, median and mode, measures of dispersion, Range, Mean deviation and standard deviation, Correlation and Regression analysis. Probability- Definition, Theory, Classical and types.		II
III	Meaning of research Problem: Research, definition, Objectives of research. Types of research-From the view point of application, Objectives, Inquiry mode. Search for existing literature, hypothesis, Interpretation and report writing.		III
IV	Introduction to philosophy: definition, nature and scope, concept, branches. Ethics: definition, moral philosophy, nature of moral judgements and reactions Ethics with respect to science and research, Intellectual honesty and research integrity, Scientific misconducts: Falsification, Fabrication" and Plagiarism (FFP), Redundant publications: duplicate and overlapping publications, salami slicing, Selective reporting and misrepresentation of data.		IV

Recommended Readings:

- ISO/IEC/17025:2005, NABL NABL -113, NABL -113A, 131, guidelines of NABL.
- 2International Standard on General requirements for the competence of testing and calibration laboratories, 1st Ed., 1999-12-15, ISO/IEC 17025:1999(E). C.G.G.
- Kothari, C.R. Research Methodology Methods and Techniques. Wiley Eastern Limited, New Delhi.
- Saferstein R. Forensic Science Handbook I, II, III.
- William L. Duncan: Total Quality, Key Terms and Concepts.
- Murray S. Cooper: Quality control in the Pharmaceutical Industry.
- John T. Rabbitt, Peter A Bergh: The ISO 9000 Book.
- Willard Merritt, Dean & Settle: Instrumental Methods of Analysis.
- Jami St. Clair Crime Laboratory Management: Academic Press.
- Thomas A the Laboratory Quality Assurance system: A manual of Quality Procedures and forms.
- Ratliff. 2003 3rd ed. John Wiley & Sons.
  Gary B Clark Systematic Quality Management. Practical Laboratory Management Series

M.Sc. (Forensic Science) Semester-II

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	II
Course Code	**Course Title**		**Course Type**
FST 251	Nano Forensics		DSE
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-
Maximum Marks	**CIA**		**ESE**
100	30		70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce students about basics of nanotechnology, synthesis and characterization of nanomaterials, Biosensors in forensics and application of DNA based biosensors in forensic investigation.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will able to understand the basic knowledge of nanomaterial and nanotechnology.	R
2	They will able to understand the methods used for nanomaterial characterization	U
3	They will also learn basic concepts of sensors-based devices.	Ap
4	They will also learn the application of protein and DNA based sensors in forensic sciences.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	3	1	3	2	1	3	2	2	3	2	3	3	3
CO2	3	-	1	3	1	3	2	1	3	2	2	3	3	2	3	3
CO3	3	-	1	3	1	3	2	1	3	2	2	3	3	2	2	3
CO4	3	-	1	3	1	3	2	1	3	2	2	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation"

Detailed Syllabus: FST 251- Nano Forensics

Unit No.	Topics	No. of Lectures	CO No.
I	The role of proteins- amino acids- nucleic acids- lipids and polysaccharides in modern biomaterials. Overview of natural Bio nanomachines: Thymidylate Synthetase, ATP synthetase, Actin and myosin, Opsin, Antibodies and Collagen, basics of nonmarital synthesis, principal of microfluidics, quantum dots, Electrochemical sensors, development of DNA aptamer sensors, optical sensors, colorimetric sensors.		I
II	Introduction, Structural Characterization, X-ray diffraction (XRD), Scanning electron, microscopy (SEM), Transmission electron microscopy (TEM), Scanning probe microscopy (SPM). Chemical Characterization, Isothermal chemistry titration (ICT), Surface Plasma Resonance, Circular dichroism, Physical Properties: Thermal stability and lattice constant, Mechanical properties, Optical properties, Electrical conductivity, Ferroelectrics and dielectrics, Superparamagnetic, Emission spectroscopy, luminescence spectroscopy, Raman spectroscopy.		II
III	Device for testing in Forensic Science laboratory, Device for drug ofabused testing, Device for testingof explosive content, development of sensors based of Lateral Flow, immunoassays based onnanomaterials, biosensors-based methods used for detection of latent fingerprints,pesticides, toxins, venom etc.		III
IV	DNA Aptamer technology and its application in forensics. Protein based nanostructures building blocksand templates – Proteins as transducers and amplifiers of biomolecular recognition events. DNA basednanostructures– Topographic and Electrostatic properties of DNA and proteins – Hybrid conjugates of gold nanoparticles – DNA oligomers		IV

Recommended Readings:

- Niemeyer.C.M. Mirkin C. A “Nanobiotechnology: Concepts, Applications and Perspectives”, WileyVCH, 2004
- Challa. S.S.R, Kumar, Josef Hormes, Carola Leuschaer,” Nanofabrication Towards Biomedical
- Applications, Techniques, Tools, Applications and Impact”, Wiley – VCH, 2005.
- Nicholas. A, Kotov, “Nanoparticle Assemblies and Superstructures”, CRC, 2006.
- David. S, Goodsell, “Bionanotechnology”, John Wiley & Sons, 2004
- Surface Plasmon Resonance Based Sensors in Springer Series on Chemical Sensors and Biosensors;Volume Four; Ed.Jiri Homola; Springer, Berlin; 2006
- Biosensors and modern biospecific analytical techniques, Volume 44 of Wilson & Wilson's
- Comprehensive Analytical Chemistry; Ed. L Gorton; Elsevier, Amsterdam, London; 2005
- The Immunoassay Handbook; Ed. David Wild; 3rd ed.; Amsterdam: Elsevier; 2005 11.
- Alternative Immunoassays; Ed. W P Collins; Chichester: Wiley; 1985
- Electrochemical Methods: Fundamentals and Applications; Allen J Bard and Larry R Faulkner;Wiley, New York, Chichester: 2nd ed.; 2001

M.Sc. (Forensic Science) Semester-II

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	II
Course Code	**Course Title**		**Course Type**
FST 252	Forensic Psychiatry		DSE
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce the students about classification of Psychology crimes, biology of behavior, criminal profiling, legal aspect of psychological test and tools used in psychological crime investigation

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	The students will able to learn about basics of crime, their element and classification..	R
2	They will know about various theories of criminal offences	U
3	They will also know about legal aspects of forensic psychology.	Ap
4	They will learn about various tests performed for the evaluation and assessment of mental status of the subjects.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	2	1	2	2	3	2	1	2	1	1	2	2	1	2	3
CO2	3	2	1	2	2	3	2	1	2	1	1	3	3	1	1	2
CO3	3	2	1	2	2	3	2	1	2	1	1	2	2	1	2	1
CO4	3	2	1	2	2	3	2	1	2	1	1	3	2	1	1	2

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation"

Detailed Syllabus: FST 252 – Forensic Psychiatry

Unit No.	Topics	No. of Lectures	CO No.
I	Historical Perspective- Indian and Global concern, Roles of Forensic psychology and forensicPsychologist, Introduction to crime, elements of crime, Modus Operandi, Classification of Crime, Typesof Crime- Economic crime, organized crime, white collor crime, Crime against women, Juveniledelinquency etc.		I
II	Theories of Criminal behavior- Biological, Physiological, Economical, Sociological, etc. Theories ofpunishment (Deterrent, Retributive and Reformative). Criminal profiling, Deductive and InductiveProfiling.		II
III	Mental Health Act 1987, Human Rights of mentally ill person, Competency to stand trial, insanitydefense, relevant sections of IPC, Correctional measures- rehabilitation of mentally ill, correctionalhome.		III
IV	Clinical Interviews, Mental status Examination, Psychological test, personality test, Intelligence test,Aptitude test etc. Therapeutic approaches – type of therapies (cognitive behavioral therapy,Psychodynamic, Humanistic etc) Tools used in Forensic Psychology- Polygraph, Narco-anlysis, Brainmapping, Hypnosis, Psychological autopsy		IV

Recommended Readings:

- A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and CriminalCases, 4th Edition, The Foundation Press, Inc., New York (1995).
- R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).
- J.C. DeLadurantey and D.R. Sullivan, Criminal Investigation Standards, Harper & Row, New York (1980).
- J. Niehaus, Investigative Forensic Hypnosis, CRC Press, Boca Raton (1999)
- E. Elaad in Encyclopedia of Forensic Science, Volume 2, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000).
- Psychology-An Introduction, Thakkar P., Dr. Ambekar A.,
- Introduction to Psychology, (1986) Morgan C.T., King R.A., Weisz J.R., Schopler J., McGraw-Hill Book Co.
- Psychological Interventions of Mental Disorders', S. K. Shrivastava, Nayanika Singh, Shivani Kant, Edition 1st, 2013, Sarup Book Publishers, PVT. LTD.
- 'Forensic Criminology', Petherick W. A., Turvey B. E., Ferguson C. E., [2010], Elsevier Inc.

M.Sc. (Forensic Science) Semester-II

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	II
Course Code	**Course Title**		**Course Type**
FST 253	Wildlife Forensic and Forensic Entomology		DSE
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce the students about wildlife crimes, conservation, poaching, wildlife crime, Identification of pug marks, Wildlife conservation agencies and entomology.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	The students will able to learn about wildlife ecology, their conservation and importance.	R
2	The students will able to learn about wildlife crimes and its investigations	U
3	The students will able to learn about illegal trading and poaching of flora and fauna	Ap
4	The students will able to learn about insects and its role in crime investigation.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	3	2	3	1	3	2	2	2	2	2	2	2	1	3	2
CO2	3	3	2	3	1	3	2	2	2	2	2	3	2	2	1	2
CO3	3	3	2	3	1	3	2	2	2	2	2	2	2	3	3	1
CO4	3	3	2	3	1	3	2	2	2	2	2	2	3	1	2	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 253 – Wildlife Forensics and Forensic Entomology

Unit No.	Topics	No. of Lectures	CO No.
I	Wildlife ecology, Definition of wildlife, free living, domestic, captive and feral animals, wildlife conservation and its importance, Zoographic regions and biomes of India, Uniqueness of Indian biodiversity, reason and causes of wildlife depletion, rare, threatened and endangered species of India.		I
II	Introduction to Wildlife Crimes and its types, Investigation of a wildlife crime scene, Different methods of killing and poaching of wildlife animals, Techniques of Species identification, types of wildlife evidences, wildlife artefacts, tools and techniques of wildlife crime investigation.		II
III	Illegal wildlife trade, Identification of pug marks of different animals, Wildlife Protection Act, 1972,Introduction to Wildlife conservation agencies-WWF, IUCN, CITES, WCCB, Wildlife conservation society, Defenders of Wildlife, Big lite Foundation, International fund for Animal welfare, National wildlife federation, Red Data Book, TRAFFIC.		III
IV	Definition, nature and scope of Forensic entomology. Types of forensic insects, collection of entomological evidence, Insect succession, molecular methods for forensic entomology. Life cycle of Insects.		IV

Recommended Readings:

- Race,R.R.and Sangar, R. Blood Groups in Man. Blackwell Scientific, Oxford.
  Saferstein,R.(1982):Science Handbook, Vol. I, II and III, Prentice Hall,
- Barris,H.andHopkinson,D.A.(1976):HandbookofEnzyme,Electrophoresis,Elsevier,North, Holland, NewYork.
  Gilblet,E.(1969):Marker's in Human Blood, Davis, Pennsylvania.
- Culliford, B. E. (1971), the examination and Typing of Blood Stains, US Dept. of Justice, Washington.
  Chowdhuri, S.(1971):Forensic Biology, BPR&D, Govt. of India.
- Dunsford, I. and Bowley,C.(1967):Blood Grouping Techniques, Oliver & Boyd, London.
- Eckert,W.G.&James, S.H.(1989): Interpretation of Blood Stain, Evidence, Elsevaier, NewYork.
- Coyle,H.M, Forensic Botany, CRC Press Working procedure manual: Biology/Serology; DFS,New Delhi.
- Essential Forensic Biology, Alan Gunn, Wiley

M.Sc. (Forensic Science) Semester-II

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	II
Course Code	**Course Title**		**Course Type**
FSL 260	Practicals based on Questioned Documents		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	-	-	2

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce students with principle of questioned documents, classification, handwriting identification, analysis of forged documents, fingerprints development and identification and tools used in questioned documents.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will able to learn the importance of examining questioned documents and Fingerprint examination in crime cases. The importance of detecting frauds and forgeries by analyzing questioned documents.	R
2	Students will able to learn the Fundamentals of fingerprints analysis and comparison of Fingerprints for Identification Purpose	U
3	Students will able to learn Natural variations and fundamental divergences in handwritings. Examination of counterfeit Indian currency notes, passports, visas and stamp papers, seal, rubber & other mechanical impressions.	Ap
4	Students will able to learn different tools and techniques used development of latent fingerprint on Crime Scene.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	2	3	2	1	2	3	1	3	3	2	3	3	2	3	3
CO2	3	2	3	2	1	2	3	1	3	3	2	3	3	2	1	3
CO3	3	2	3	2	1	2	3	1	3	3	2	3	3	2	3	3
CO4	3	2	3	2	1	2	3	1	3	3	2	3	1	3	3	2

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FSL 260 – Practicals based on Questioned Documents and Fingerprints

Unit No.	Topics	No. of Lectures	CO No.
I	• Comparison of Handwriting and Signatures. • Examination of Erasures on Questioned document.		I
II	• Examination of Obliteration on Questioned document. • Examination of Addition on Questioned document. • Decipher unknown Secret Writings. • Chromatographic comparison of different ink.		II
III	• Ten-digit finger print classification. • To identify the finger Print Patterns. • To perform ridge tracing and ridge counting. • To identify the ridge characteristics.		III
IV	• To develop latent finger Prints with powder methods. • To develop latent finger Prints with chemical methods. • Development of latent finger print on glass, paper, polished surface etc.		IV

Recommended Readings:

- Hilton; O. Scientific Examination of Questioned Documents, Elsevier, NY
- Albert S. Osborn; Questioned Documents, 2nd Ed., Universal Law Pub., Delhi
- WilsonR. Harrison; Suspect Documents Their Scientific Examination, Universal Law Pub. Delhi Indian
- Hardless H.R; Disputed Documents, Handwriting and Thumbs–Print identification, profusely illustrated, Law Book, Allahabad
- Morris Ron N. Forensic Handwriting Identification; Academic Press, London.
- RoyA Huber, A.M. Headrick; Handwriting Identification-Facts and Fundamental, CRC Press
- Laboratory working procedure manual, Documents DFS, New Delhi, 2005 J.E. Cowger, Friction Ridge Skin, CRC Press, Boca Raton (1983).
- D.A. Ashbaugh, Quantitative-Qualitative Friction Ridge Analysis, CRC Press, Boca Raton (2000).
- C. Champod, C. Lennard, P. Margot an M. Stoilovic, Fingerprints and other Ridge Skin Impressions, CRC Press, Boca Raton (2004).
- Lee and Gaensleen's, Advances in Fingerprint Technology, 3rd Edition, R.S. Ramotowski (Ed.), CRC Press, Boca Raton (2013).

M.Sc. (Forensic Science) Semester-II

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	II
Course Code	**Course Title**		**Course Type**
FSL 270	Practicals based on Forensic Genetics & DNA Profiling		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	-	-	2

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce the students with hands on training in Forensic Genetics and DNA forensic techniques.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will able to learn isolate genomic DNA from various crime scene samples.	R
2	Students will able to learn about DNA protein infarction and physical properties of DNA	U
3	Students will able to learn uses of PCR in DNA forensic investigation.	Ap
4	Students will able to learn about role of STR polymorphism in forensic investigation.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO2	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO3	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO4	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FSL 270 – Practical's based on Forensic Genetics & DNA Profiling

Unit No.	Topics	No. of Lectures	CO No.
I	• Extraction and isolation of DNA from body fluid. • Extraction and isolation of mitochondrial DNA.		I
II	• Study of DNA-protein interaction study using non-radioactive electrophoretic mobility assay (EMSA) • To perform the DNA denaturation and renaturation kinetics.		II
III	• To perform DNA Fragmentation Assay • Gender identification using Amelogenin gene PCR amplification.		III
IV	• To perform DNA typing using PCR. • Detection of Single nucleotide polymorphism in STR alleles.		IV

Recommended Readings:

- Saferstein, Richard, Hand book of forensics science, Vol.I, II, (Ed.) Prentice hall, Eaglewood cliffs, NJ;
- William Goodwin, Adrian Linacre, Sibtehadi; An Introduction to Forensic Genetics John wiley & Son's Ltd, UK
- Coyle, H. (Ed.) Non-human DNA typing, International forensic science and investigation series, CRC Press, Bocaraton.
- Linacre,A.(Ed.) Forensic science in wildlife investigations, International forensic science and investigation Series, CRC Press, Boca Raton.
- Bruce budowle, Steven.Schutzer, Rogerg. Breeze And Paul S. Keim Microbial Forensics
- Niels Morling, Handbook of Forensic Genetics (Forensic Science And Medicine)Humana Press.
- John M. Butler FORENSIC DNA TYPING, Second edition: Biology, Technology, And genetics of STR Markers Elsevier Academic Press.

M.Sc. (Forensic Science) Semester-II

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	II
Course Code	**Course Title**		**Course Type**
FSL 280	Practicals Based on Forensic chemistry& Forensic Toxicology		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	-	-	2

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce the students with hands on training in analysis of alcohol, abused drugs, adulteration detection in oil, acid burn, plant toxin and pesticides analysis.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will able to learn to identify adulteration in alcohol	R
2	Students will able to learn Identify drugs using color test and TLC	U
3	Students will able to learn identify plant toxic alkaloid.	Ap
4	Students will able to learn the analysis of viscera samples of pesticides consumption	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	3	3	2	2	3	3	3	3	2	2	2	2	3	2	1
CO2	3	3	3	2	2	3	3	3	3	2	2	2	3	1	2	2
CO3	3	3	3	2	2	3	3	3	3	2	2	3	3	3	1	2
CO4	3	3	3	2	2	3	3	3	3	2	2	2	2	1	3	2

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FSL 280 – Practicals Based on Forensic chemistry& Forensic Toxicology

Unit No.	Topics	No. of Lectures	CO No.
I	• Determination of methanol and ethanol in liquor sample • Analysis of narcotic drugs by TLC		I
II	• Determination of Ethanol and Methanol in alcoholic liquors • Examination of inorganic acid in partially burnt clothe		II
III	• Detection of adulterant in vegetable oil • Identification of opium/ dhatura alkaloids by TLC		III
IV	• Identification of poisonous seeds- Ricinus, Croton and Argemone. • Analysis of viscera(simulated sample) for Organo Chloro and Organo Phosphorous pesticides		IV

Recommended Readings:

- John D. DeHaan ; Kirk's Fire Investigation, Prentice Hall Eaglewood Cliffs, N.J
- Yinon J; Modern Methods & Application in Analysis of Explosives, John Wiley.
- C.A. Watson; Official and standardized Methods of Analysis. Royal Society of Chemistry, UK.
- Goutam, M. P. and Goutam S Analysis of Plant Poison, Selective & Scientific Books, New Delhi.
- Feigl; Spot Test in Organic Analysis, Elsevier Pub., New Delhi.
- Curry A.S; Analytical Methods in Human Toxicology, Part II, CRC Press Ohio
- Clark, E.G.C.; Isolation and Identification of Drugs, Vol I&II, Academic Press, Sunshine I; Year book of Toxicology, CRC Press Series, USA
- Michael J. Deverlanko et al: Hand Book of Toxicology CRC Press, USA.
- Parikh C.K; Text Book of Medical Jurisprudence Forensic Medicines and Toxicology. CBS Pub. New Delhi.

Forensic Science) Semester-II

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	II
Course Code	**Course Title**		**Course Type**
FSL 290	Practicals Based on Forensic Psychiatry		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	-	-	2

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce the students with case study of NARCO analysis, serial murder cases, hypnosis and personality assessment using EPI and MMPI.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will able to learn working principle narco and polygraph analysis of criminals	R
2	Students will able to learn about hypnosis and its detection	U
3	Students will able to learn the assessment of intelligence and mental status.	Ap
4	Students will able to learn Assessment of personality using EPI and MMPI.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	2	2	3	2	3	3	3	3	3	2	2	2	3	3	1
CO2	3	2	2	3	2	3	3	3	3	3	2	3	2	2	2	2
CO3	3	2	2	3	2	3	3	3	3	3	2	2	3	2	2	1
CO4	3	2	2	3	2	3	3	3	3	3	2	3	2	1	1	2

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FSL 290 – Practical based on Forensic Psychiatry

Unit No.	Topics	No. of Lectures	CO No.
I	• To cite a criminal case in which narco analysis was used as a means to detect deception. • To review a crime case involving serial murders. Comment on the psychological traits of the accused.		I
II	• To study a criminal case in which hypnosis was used as a means to detect deception. • Assessment of intelligence through inventories..		II
III	• Assessment of mental status through interviews. • Assessment of personality using EPI.		III
IV	• Assessment of personality using MMPI. • To prepare a report on relationship between mental disorders and forensic psychology..		IV

Recommended Readings:

M.Sc. (Forensic Science) Semester-II

Program	Subject	Year	Semester
M.Sc.	Forensic Science	1	II
Course Code	**Course Title**		**Course Type**
FST 300	Elementary Forensic & Crime Scene Management		GE
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-
Maximum Marks	**CIA**		**ESE**
100	30		70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to provide a guide in managing Crime Scene investigation. This course enrich students with knowledge of Collection of various type of evidences, search methods, crime scene documentation and reconstruction of crime scenes.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Understanding the basic principles of forensic science.	R
2	Understanding the methods of search and approaches for crime scene processing.	U
3	Understanding physical evidence and its collection preservation.	Ap
4	Understanding the crime scene events and its reconstruction.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	2	2	2	2	2	-	2	3	2	2	3	3	2	2	2
CO2	3	3	2	2	2	2	-	2	3	2	2	3	2	2	1	2
CO3	3	3	2	2	3	2	-	2	3	2	2	3	3	3	1	2
CO4	3	3	2	2	3	2	-	2	3	2	2	3	2	1	1	2

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 300 -Elementary Forensic & Crime Scene Management

Unit No.	Topics	No. of Lectures	CO No.
I	Forensic Science, History and development of Forensic Science, Basic Principles of forensic science, Branches of Forensic Sciences		I
II	Scene of Crime: Types, Protection of scene of crime, Search Approaches, Documentation & Sketching; Crime Scene photography and its significance.		II
III	Physical Evidences: Classification and Characteristics, Collection, Packing and Forwarding of physical evidences, , Crime Scene Tool, Kits and Equipment.		III
IV	Crime scene reconstruction & report writing; Modus operandi and Corpus delicti. Role of First responding Officer; Experts opinion.		IV

Recommended Readings:

- Siegel, J. A., Saukko, P. J. And Knupfer, G.C., Encyclopedia of Forensic Sciences, Academic Publishers, London
- Kirk,P.L. Fire Investigations, John Wiley and Sons
- Saferstein : Forensic Science Handbook, VolI, II& III, Prentice Hall Inc. USA
- Anita.Y. Wonder; Bloodstain Pattern Elsevier, London
- Barry,A.J.Fisher.; Techniques of CrimeSceneInvestigation,6thEdition Ed, C.R.C Press NY(2003)
- Kirk: Criminal Investigation, 1953, Interscience Publisher Inc. New York
- Mordby, JDeed Reckoning; The Art of Forensic Detection, CRC Pre LLC(2000)

M.Sc. (Forensic Science) Semester-III

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	III
Course Code	**Course Title**		**Course Type**
FST 310	Computer Forensics and Digital Investigations		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
04	04	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce the students with basics of computer hardware's and operating system, classification of computer crimes, uses of forensic tools and network forensics like Printer.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	The students will learn about basics of computer hardware, software and networking.	R
2	They will learn about classification of various computer crime and its investigation techniques.	U
3	They will learn about how to use advance forensic tools used in computer crime investigation.	Ap
4	They will learn about various Information Technology acts and network forensic investigation.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	3	2	2	2	2	3	2	3	3	2	3	2	3	3	2
CO2	3	2	2	3	2	2	3	2	3	3	2	3	2	2	2	2
CO3	2	2	2	2	3	2	3	2	3	3	2	3	3	3	2	2
CO4	3	3	2	3	2	2	3	2	3	3	2	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 310 – Computer Forensics and Digital Investigations

Unit No.	Topics	No. of Lectures	CO No.
I	Introduction to computer, Operating System Windows/Unix: Operating system and operating environments DOS, Window 95 and 98, Windows NT, Windows2000, Windows XP, Windows Vista, Windows7andUnix. Limitations of operating system, Networking, LAN, WAN, Internet and their forensic significance.		I
II	Introduction; Classification; Difference between cyber and conventional crimes; Types of cybercrimes–Cyberstalking; Cyber pornography; forgery and fraud; Cyberterrorism; Spamming, Phishing, Privacy and National Security in Cyberspace, Cyber Defamation and hate speech, computer vandalism economic crimes, Internet or another telecommunication. Hacking, computer viruses and investigative techniques.		II
III	Open Source versus Closed Source. Portable Devices & Mobile Phone Forensics, functioning of mobile phone and their operating. Search, Seizure, packaging and transporting of the digital evidence from the scene of crime. Use of Forensic Tool, FTK, Access data Forensic Tool Kit and preparation of the search of computer evidence to preparing court room testimony based upon the examination. Password Recovery Tools.		III
IV	Advance practice in Digital Investigation Electronic format and representation in the court as per the Law suit. Fundamentals of current, domain administration; file system management; networked printers; user management; and workstation configuration. Linux Systems, key components of the Linux/UNIX operating system. History of its evolution, selection criteria for Linux/UNIX as an alternative (or cooperative) operating environment in the business world.		IV

Recommended Readings:

- Relevant sections of Information technologyAct2000.
- Esharenana, Adoni, Frame works for ICT Policy Government, Social and Legal Issues. Information Science Reference, Harsey, New YORK.
- Robert C. Newman, Computer Forensics: Evidence Collection and Management AuerbachPublications.
- Eoghan Casey, Handbook of Computer Crime Investigation: Forensic Tools and Technology,Academic Press
- Clark, Franklin, and Diliberto, Ken, (1996). Investigating computer Crime, CRC Press, Boca Raton, Florida, USA
- Tewari, R.K., Sastry, P.K. and Ravikumar, K.V. (2003): Computer Crime & Computer Forensics, Select Publisher, New Delhi.
- Lang, DavidL., (2002). Introduction to Computer forensics, CRC Press LLC, Boca Raton, Florida, USA
- Middleton, Bruce (2001). Cyber Crime Investigator's Field Guide, CRC Press
- Vacca John R; Computer Forensics, Computer Crime Scene Investigation, Firewall Medial, An imprint of Laxmi Pub. (2002)

M.Sc. (Forensic Science) Semester-III

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	III
Course Code	**Course Title**		**Course Type**
FST 320	Forensic Ballistics and Physics		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
04	04	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce the students with firearms, ammunition, GSR analysis, Explosive classification and its analysis, analysis of glass in crime cases, forensic analysis of soil, paper and fiber.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will learn about Basics of forensic ballistics and will learn about various firearms, classification and examination of firearms.	R
2	Students will learn about Comparison of various firearm evidences and examination of various physical evidences.	U
3	Students will learn about Tool marks, composition of glass and its fracture analysis.	Ap
4	Students will learn about examination of various physical evidences such as glass, fibre, soil, etc. and its characteristics, examination and presentation in courtroom as evidence.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	1	2	3	2	3	3	2	-	1	1	3	3	2	2	2
CO2	3	1	3	2	2	3	3	1	-	1	1	3	2	2	2	2
CO3	3	1	2	3	2	3	3	1	-	1	1	3	3	3	2	2
CO4	3	1	3	2	2	3	3	2	-	1	1	3	2	2	3	2

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 320 – Forensic Ballistics and Physics

Unit No.	Topics	No. of Lectures	CO No.
I	Introduction, History and Scope, Internal, External and Terminal Ballistics, Firearms, Definition and Classification, Characteristics and firing mechanism of smooth bored and Rifled firearms (Pistol, Revolver, and Rifles, etc), Classification, nomenclature and construction of country made firearms.		I
II	Definition, classification and constructional features of different types of Cartridge, Types of primer & priming composition, propellant and their compositions, Bullets, Pellets and wads. Gun Shot Residues (GSR) analysis, Explosives: definition, types and classification of explosives, Arms and Explosives Act, Firearm injuries.		II
III	Definition, area and scope, Types and Characteristics of Tool marks: Glass: Types of glass and their composition, Types and Identification of glass fractures, examination and its forensic significance.		III
IV	Forensic analysis of Paint**,** Soil, Papers, Foot Prints and Tyre Impression, Principle & Technique of Restoration, Etching Reagents, Fibers - Classification and Characteristics examination of fibers ,Physical matches of broken objects.		IV

Recommended Readings:

- Working Procedure Manual Ballistics/Physics, DFS, New Delhi,2005
- Hatcher Jury & Weller, 1987: Firearm Investigation Identification and Evidence, the University BookAgency, Allahabad.
- Gunther & Gunther, 1935: The Identification of Firearms, Willies, New York.
- Jauhri, M. 1980: Monograph on Forensic Ballistics, Govt. of India Publication, New Delhi.
- Burrad, 1951: The Identification of Firearms and Forensic Ballistics.
- Sharma, B.R.: Firearms in Criminal Investigation and Trails, 1990.
- Dimado: Gunshot Wounds, 1987.
- Kumar K: Forensic Ballistics in Criminal Justice, 1987
- Raymond C Murray & John C.F Tedrew; Forensic Geology, Prentice Hall NJ.
- B. Caddy; Forensic Examination of Glass and Paints Analysis and Interpretation ISBN 0784 05749(2001)
- Safferstein, R, Handbook of Forensic Science, Vol. I, II, (Ed.) Prentice Hall, Eaglewood Cliffs, NJ.

M.Sc. (Forensic Science) Semester-III

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	III
Course Code	**Course Title**		**Course Type**
FST 330	Forensic Medicine		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
04	04	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce the students with basics of forensic medicine, postmortem examination, natural death examination, classification and investigation of injuries and burn case investigation.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will know about basics of autopsy, its procedure and application for forensic purpose.	R
2	Students will also know about various aspects of death and its investigation.	U
3	Students will learn how to estimate post mortem interval.	Ap
4	They will also learn about various types of injuries, their cause and medicolegal aspects.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	1	1	-	2	3	2	1	1	2	3	2	3	2	2	3
CO2	3	1	1	-	2	3	2	1	1	2	3	3	2	2	3	2
CO3	3	1	1	-	2	3	1	1	1	2	3	2	3	3	2	3
CO4	3	1	1	-	2	3	1	1	1	2	3	3	2	2	3	2

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 330 – Forensic Medicine

Unit No.	Topics	No. of Lectures	CO No.
I	Forensic Medicine- Definition, Scope and Importance, The Forensic Autopsy, Post-mortem changes, Post mortem Hypostasis, Post mortem report, Role of Forensic Pathologist medico-legal Expert in the investigation of death, collection and preservation of post mortem exhibits.		I
II	Death: Definition, types, and nature Scene Investigation, Introduction to Sudden and unexpected Death, Infanticide, Thermal Deaths, Anesthetic and operative death, Death due to Drowning and Electrocution, Starvation and its types, Asphyxial Death, Time of Death-Time Indicators Bladder content, Stomach Content, Lividity, Cooling of body, Rigor Mortis,		II
III	Injuries-Definition and Nature, Age of injuries, Ante-mortem and Post mortem, Fatal injuries, Incapacitation, After effects of Fatal injuries, Introduction to Trauma to the human body, Wounds Due to Blunt Trauma. Blunt Trauma Injuries of the Trunk and Extremities, Trauma to the Skull and Brain: Cranio-cerebral Injuries, Wounds Due to Pointed and Sharp, Edged. Classification -Abrasion, contusion, Bruise, Laceration, Punctured Incised, Gun shot.		III
IV	Burns-Classification of burns Ante-mortem and Post mortem Burns, Cause of death, Scalding, Electrocution the Effects of Heat & Cold: Hyperthermia & Hypothermia, Deaths Due to Fire, Carbon Monoxide Poisoning.		IV

Recommended Readings:

- David Dolinak, Evan Matshes , Emma O. Lew .Forensic Pathology: Principles and Practice ,Academic Press
- Dominick DiMaio , Vincent J.M. DiMaio M.D.Forensic Pathology, Second Edition (PracticalAspects of Criminal & Forensic Investigations) CRCPress.
- Matshes & Dolinak & Lew Forensic Pathology, Principles and Practice 1st Edition Academic Press
- Jay Dix , Robert Calaluce, M Guide to Forensic Pathology,. CRC
- Vincent J.M. DiMaio , Suzanna E. Dana Handbook of Forensic Pathology, Second Edition,CRC
- Richard Shepherd. Simpson's Forensic Medicine, Hodder Arnold;
- Payne-James, Jason (ed.; et al.) Encyclopedia of Forensic & Legal Medicine. Amsterdam; Boston: Elsevier Academic Press
- Werner U. Spitz (Author, Editor), Daniel J. Spitz. Spitz and Fisher's Medicolegal Investigation of Death: Guidelines for the Application of Pathology to Crime Investigation [Hardcover] Charles C Thomas Pub Ltd
- Parikh C.K. Text book of Medical Jurisprudence, forensic medicine and toxicology. CBS Publishers and Distributors , New Delhi
- Subrahmanyam B.V.; Modi’s Medical Jurisprudence & Toxicology, LexisNexis Butterworths, India .

M.Sc. (Forensic Science) Semester-III

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	III
Course Code	**Course Title**		**Course Type**
FST 340	Forensic Anthropology		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
04	04	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce the students with fundamentals of physical and biological anthropology, human evolution, skeletal anatomy and its uses in forensic investigation, personal identification, facial reconstruction and forensic odontology.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will learn about basics of anthropology and its application in the court of law.	R
2	They will know about determination of age, sex, race, ethnicity etc from skeletal remains	U
3	They will know about various personal identification techniques and forensic importance.	Ap
4	They will learn about the role of odontology in personal identification, collection, preservation and forensic analysis of bite marks	An

CL: Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	2	1	1	2	2	1	3	2	2	1	3	2	3	3	3
CO2	3	2	1	1	2	2	1	3	2	2	1	3	2	2	2	2
CO3	3	2	1	1	2	2	1	3	2	2	1	3	3	2	2	2
CO4	3	2	1	1	2	2	1	3	2	2	1	3	2	2	2	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 340 – Forensic Anthropology

Unit No.	Topics	No. of Lectures	CO No.
I	History of Anthropology. Definition and scope of Physical/Biological Anthropology The scope of anthropology (Paleo anthropology, skeletal biology and human osteology, Paleopathology and Bio-archaeology, Forensic Anthropology), Fundamental of Physical/Biological Anthropology: Human evolution Fossils evidence of Human Evolution, Human variation. Concepts of Medical Anthropology, Dental Anthropology, Forensic Anthropology and Sports Anthropology.		I
II	Forensic Anthropology definition scope and Problems, Human skeleton, comparative skeletal anatomy of human and non-human. Bones- Identification, Classification and determination of Site, Morphological and Anatomical Characteristics, Determination of Age, Sex, Race and Stature determination from skeletal remains: skull, Pelvis, and other bones.		II
III	Introduction and forensic importance; Significance of somatoscopy, somato-metery, osteo-metery and craniometery in Personal Identification; Portrait Parle/Bertillon system, Facial reconstruction, Superimposition technique.		III
IV	Development and scope, Types of dentition, Basic structure of human teeth, types of teeth & their morphology. Age determination from teeth: dental anomalies and their role in Personal Identification, Its role in mass disaster and anthropology, Forensic significance of Bites marks: Types & forensic importance; Collection and preservation of samples, analysis of Bite marks, presentation of bite marke vidences in court of law Photography, evaluation and legal significance of bite marks. Role of Forensic Odontology in mass disaster victim identification; Dental Charting; Comparison of Ante-mortem andpost-mortem dental records		IV

Recommended Readings:

- Bernard H.R. (1940). Research Methods in Cultural Anthropology. Newbury Park: Sage
- Publications.
- Davis K. (1981). Human Society. New Delhi: Surjeet Publications.
- Ember C. R. et al. (2011). Anthropology. New Delhi: Dorling Kindersley.
- Steven N. Byers Introduction to Forensic Anthropology. Allyn & Bacon.
- Karen Ramey Burns , Forensic Anthropology Training Manual, The (2nd Edition) Prentice Hall
- Debra Komar Jane Buikstra, Forensic Anthropology: Contemporary Theory and Practice OxfordUniversity Press, USA
- M. Anne Katzenberg (Editor), Shelley R. Saunders, Biological Anthropology of the HumanSkeleton, Wiley-Liss
- Tim D. White , Michael T. Black, Pieter A. Folkens ,Human Osteology, Third Edition , AcademicPress
- D. Gentry Steele, Claud A. Bramblett, The Anatomy and Biology of the Human Skeleton ,TexasA&M University Press
- Forensic Dentisty by Paul G. Stimson, Curtis A. Mertz; CRC Press, LLC, 1999.
- Craniofacial Identification in forensic Medicine, edited by John. G Clement and David. L. Ransoxiford University, Press; 1998.

M.Sc. (Forensic Science) Semester-III

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	III
Course Code	**Course Title**		**Course Type**
FST 351	Recent Advance in Forensic Chemistry		DSE
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce students about abused drugs, anabolic steroid, liquor and its adulteration, trace evidence analysis, NDPS act.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	The students will know about recent advancement in the tools and techniques for the analysis of alcoholic beverages, country made liquor and illicit liquor.	R
2	They will also know about chemistry of fire, pattern of fire, and analysis of arson evidences.	U
3	Students will have an idea about various abused drug, their identification as well as their qualitative and quantitative analysis.	Ap
4	They will learn about various trace evidences, their importance and also about their forensic examination.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	2	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO2	3	2	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO3	3	2	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO4	3	2	1	-	2	3	3	3	3	1	1	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 351 – Recent Advance in Forensic Chemistry

Unit No.	Topics	No. of Lectures	CO No.
I	Analysis of beverages: Alcoholic and non-alcoholic beverages, IMFL, country made liquor, licit and illicit liquors, Analysis of Proof spirit, Rectified spirit, denatured spirits, Special denatured spirit, Blood alcohol analysis by chemical methods; Significance of blood alcohol, Breath Screening devices		I
II	Arson: chemistry of fire, pattern of fire, investigation and evaluation of clue material, analysis of arson exhibits by instrumental method, Examination of petroleum products: distillation and fractionation, standard methods of analysis of petroleum products like kerosene, petrol, diesel, lubricating oil, greases..		II
III	Drugs of abuse: introduction, classification of drugs of abuse, drugs of abuse in sports, designers drugs and their forensic examination. Qualitative and quantitative analysis of Opium and opiates. Forensic examination of precursor chemicals and drugs under NDPS Act 1985.		III
IV	Analysis of trace evidence: cosmetics, dyes, paints, pigments, fibers, oils, fats, greases, soil and industrial dusts, chemicals; Analysis of corrosive chemicals- acids and alkalies; Chemistry and examination of detective dyes uses in trap cases; Examination of cement and concrete, consumer item as gold, silver etc.		IV

Recommended Readings:

- Clark, E.G.C.: Isolation and identification Drugs, Vol. I and Vol.II, (1986).
- Vogel's Qualitative Inorganic Analysis (7th Edition) revised by G.Svehia (2nd Impression2006).
- Working Procedure Manual – Chemistry, DFS Publications (2005).
- IS:3752; 1988 Indian Standard Alcoholic Drinks – Methods of Test, First Revision (1988)
- IS:323-1959, Indian Standard Specification for rectified sprit, revised, 9th reprint, December (1989)
- The ISI Specification for Kerosene (IS: 1459/1974)
- The ISI Specification for Motor Gasoline (IS: 2796/2000)
- The ISI Specification for Diesel (IS: 1460/2000)
- The Indian Standard Methods of Test for Petroleum Products IS:1448
- The ISI Specification for Gear Lubricants (IS: 2297/1997)
- The ISI Specification for Petroleum Hydrocarbon Solvents (IS: 1745/1978)
- Fire and Arson Investigation, J. Kennedy, Chicago (1962)
- Forensic Science Hand Book, by Saferstein, R., Printice Hall : N. Jersey, 1982

M.Sc. (Forensic Science) Semester-III

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	III
Course Code	**Course Title**		**Course Type**
FST 352	Forensic Genomics, Proteomics and Bioinformatics		DSE
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-
Maximum Marks	**CIA**		**ESE**
100	30		70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce the student's human genome organization, analysis of genome, sequencing technologies, Bioinformatics and proteomics.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will learn about genome content, complexity and its organization.	R
2	They will learn about tools used in genome mapping, analysis and modern genome sequencing techniques and its applications.	U
3	They will learn about protein structure, composition and instrumental analysis methods in forensic science	Ap
4	In practical aspects they will able to learn about molecular biology techniques used for analysis of forensic DNA and proteins	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO2	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO3	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO4	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 352 – Forensic Genomics, Proteomics and Bioinformatics

Unit No.	Topics	No. of Lectures	CO No.
I	Human genome: Genome project history, organization and goals of human genome project, Mapping strategies, DNA segment nomenclature, Human genome diversity, organization of human genome, Comparative genomics: Overview of prokaryotic and eukaryotic genomes, C-value, number of genes and complexity of genomes, Conservation and diversity of genomes, Comparative genomics as an aid to gene mapping and study of human disease genes.		I
II	Structure and organization of eukaryotic genomes- nuclear and mitochondrial; Computational analysis, Databases, Finding STR markers; Tools for genome analysis– PCR, RFLP, DNA fingerprinting, RAPD ,SNP detection, SSCP; Human Genome mapping methods, BAC libraries and shotgun libraries preparation, Physical map, Cytogenetic map, Contig map, Restriction map, UCSC browser. Introduction to sequencing, Maxam and Gilbert method, Sanger Sequencing techniques and applications; Next Generation sequencing (NGS), Introduction to NGS, quality check, Library Preparations, sequencing reaction); Platform overview (Illumina, 454 (Roche), SOLiD (Life technology), Ion Torrent, Nanopore, PacBio; Types of NGS, DNA-sequencing - Whole genome sequencing, exome sequencing		II
III	Pairwise sequence alignment: BLAST, PSI-BLAST, CLUSTAL-W, CLUSTAL-X, Phylogenetic analysis: Sequence Alignment formats: Sequence Alignment/Map (SAM) format, Binary Alignment/Map(BAM) format, Application of different sequencing technique, Bioinformatics resource: NCBI, EBI, ExPaSy, DNA database, Protein Databases.		III
IV	Overview of protein structure-primary, secondary, tertiary and quaternary structure, Relationship between protein structure and function; Outline of a typical proteomics experiment, Identification and analysis of proteins by 2D analysis, Spot visualization and picking; Tryptic digestion of protein and peptide fingerprinting, Mass spectrometry; far western analysis; Protein interaction maps, Protein arrays definition; applications-diagnostics, expression profiling. Human forensic proteome, Non-traditional Forensics, Proteomics for microbial forensic.		IV

Recommended Readings:

- Brown TA (2006) *Genomes*, 3rd Edition, Garland Science.
- Campbell AM and Heyer LJ (2007) *Discovering Genomics, Proteomics and Bioinformatics.*Benjamin Cummings.
- Primrose S and Twyman R (2006) *Principles of Gene Manipulation and Genomics*, 7th Edition,Blackwell.
- Rehm H (2006) *Protein Biochemistry and Proteomics*, 4th Edition, Academic Press.
- Twyman RM. (2013) *Principles of Proteomics*, Second Edition by Garland Science Taylor & FrancisGroup New York and London.
- Liebler DC (2002) *Introduction to Proteomics: Tools for the New Biology*, Humana Press, TotowaNJ. USA.

M.Sc. (Forensic Science) Semester-III

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	III
Course Code	**Course Title**		**Course Type**
FST 353	Forensic Microbiology and Immunology		DSE
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce the students to basic of microbiology and immunology and its forensic application.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will understand the types, nature and importance of microbes.	R
2	Students will understand application of microbes in forensic investigation.	U
3	Students will understand basics of various aspects of human immunology.	Ap
4	Students will understand the practical application of immunology in development of forensic investigation.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO2	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO3	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO4	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 353 – Forensic Microbiology and Immunology

Unit No.	Topics	No. of Lectures	CO No.
I	Microbes and Forensic Science: General characteristic of Virus, Bacteria and fungus (Morphology, Nutrition, reproduction& economic importance). Bacteria of Forensic importance. Fungi of forensic importance, Anti-bacterial & Antifungal agents. Forensic Aspects of Biological Toxins. Forensic Analysis of Trace and Unculturable Specimens etc.		I
II	Biological agents in warfare: Collection, transportation and preservation of microbial forensic samples, Sterilization (Physical & Chemical) Categories of biological weapons; Toxins and their mode of action &identification, laboratory setup, epidemiologic investigation for public health, investigation of suspicious disease outbreak; Biosafety and biosecurity, Bio-surveillance documentation and case studies.		II
III	Introduction to Immune system: Cells and organs of Immune system. Innate immunity: Complement system, phagocytosis, extravasation, Toll like receptors, Host-microbe interaction. Acquired Immunity: B-cell and T-cell proliferation and maturation, Major Histo-compatibility complex (MHC-I& MHC-II),Antigen presentation, Hypersensitivity, Immunization.		III
IV	Immunological communication and immunological receptors, Immunological mediators, Humoral & Cell mediated Immunity, Hybridoma technology and monoclonal antibodies. Animal cell culture for immunological research (Cell line, Culture media, Culturing technique & aseptic condition). Scope in forensic immunology, Toxin & drug mediated immune-modulation, Animal model for forensic immunological research. ELISA, Western Blotting, Flow Cytometry.		IV

Recommended Readings:

- Kindt, T. J., Goldsby, R. A., Osborne, B. A., & Kuby, J. (2006). *Kuby Immunology*. New York: W.H.Freeman.
- Paul, W. E. (1993). *Fundamental Immunology.* New York: Raven Press
- AK Abbas, (2015), *Cellular and Molecular Immunology*. 8th Edition, Elsevier.
- Ananthanarayan and Paniker, *Textbook of Microbiology*, 8th Edition.
- Baveja CP, (2001) *Textbook of Microbiology.* 5th Ed., Mcgraw Hill Education.

M.Sc. (Forensic Science) Semester-III

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	IIII
Course Code	**Course Title**		**Course Type**
FSL 360	Practicals based on Computer Forensic & Digital Investigations		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	-	-	02
Maximum Marks	**CIA**		**ESE**
100	30		70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce the student's to basic of digital evidence collection, detection of deleted files, email forensics, encrypted data recovery, hand imaging.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will able to learn identification, seize and preserve digital evidence	R
2	Students will able to learn to detect deletions, obliterations and modifications of files using Autopsy and encase software's	U
3	Students will able to learn to cryptographic PGP, email forensics, identification of encrypted and hidden files	Ap
4	Students will able to learn imaging hard disk and protection of digital records.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO	POs											PSO				
CO	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO2	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO3	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO4	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FSL 360- Practicals Based On Computer Forensics and Digital Investigations

Unit No.	Topics	No. of Lectures	CO No.
I	• . To identify, seize and preserve digital evidence from crime scenes. • To detect deletions, obliterations and modifications of files using encase software. • To trace routes followed by e-mails and chats.		I
II	• To identify the IP address of the sender of e-mails. • To demonstrate concealment techniques using cryptographic PGP.		II
III	• To identify encrypted files. • To identify hidden files.		III
IV	• To use digital signatures for securing e-mail and online transactions. • To acquire data from PCs/laptops/HDDs/USBs, pen drives, memory cards and SIM cards. • To use symmetric and asymmetric keys for protection of digital record. • To carry out imaging of hard disks.		IV

Recommended Readings:

- Relevant sections of Information technologyAct2000.
- Esharenana, Adoni, Frame works for ICT Policy Government, Social and Legal Issues. Information Science Reference, Harsey, New YORK.
- Robert C. Newman, Computer Forensics: Evidence Collection and Management AuerbachPublications.
- Eoghan Casey, Handbook of Computer Crime Investigation: Forensic Tools and Technology,Academic Press
- Clark, Franklin, and Diliberto, Ken, (1996). Investigating computer Crime, CRC Press, Boca Raton, Florida, USA
- Tewari, R.K., Sastry, P.K. and Ravikumar, K.V. (2003): Computer Crime & Computer Forensics, Select Publisher, New Delhi.
- Lang, DavidL., (2002). Introduction to Computer forensics, CRC Press LLC, Boca Raton, Florida, USA
- Middleton, Bruce (2001). Cyber Crime Investigator's Field Guide, CRC Press
- Vacca John R; Computer Forensics, Computer Crime Scene Investigation, Firewall Medial, An imprint of Laxmi Pub. (2002)

M.Sc. (Forensic Science) Semester-III

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	III
Course Code	**Course Title**		**Course Type**
FSL 370	Practicals Based on Forensic Ballistics & Physics		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is providing hands on training for identification of bullets, cartridges, analysis of tool marks, analysis of pain and glass.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Identification of firearm, cartridge, bullets.	R
2	Making replica of impression evidences	U
3	Forensic Analysis of soil, paint	Ap
4	Forensic Analysis of glass	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO2	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO3	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO4	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed syllabus: FSL 370- Practicals Based on Forensic Ballistics & Physics

Unit No.	Topics	No. of Lectures	CO No.
I	• Identification of firearms, cartridges, bullets, gunpowder, etc • Matching by comparison microscope bullets and cartridge cases.		I
II	• Lifting or prints and impressions by caste and replicas. • Sole prints comparison and their lifting from the crime scene • Comparison of Tool Marks		II
III	• Comparison of soil samples by Density gradient tube method. • Comparison of broken glass bangles. • Restoration of erased identification marks.		III
IV	• Physical matching of broken pieces of different objects. • Determination of density of glass		IV

Recommended Readings:

- Working Procedure Manual Ballistics/Physics, DFS, New Delhi,2005
- Hatcher Jury & Weller, 1987: Firearm Investigation Identification and Evidence, the University BookAgency, Allahabad.
- Gunther & Gunther, 1935: The Identification of Firearms, Willies, New York.
- Jauhri, M. 1980: Monograph on Forensic Ballistics, Govt. of India Publication, New Delhi.
- Burrad, 1951: The Identification of Firearms and Forensic Ballistics.
- Sharma, B.R.: Firearms in Criminal Investigation and Trails, 1990.
- Dimado: Gunshot Wounds, 1987.
- Kumar K: Forensic Ballistics in Criminal Justice, 1987
- Raymond C Murray & John C.F Tedrew; Forensic Geology, Prentice Hall NJ.

M.Sc. (Forensic Science) Semester-III

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	III
Course Code	**Course Title**		**Course Type**
FSL 380	Practicals Based on Forensic Anthropology		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

These learning objectives aim to develop a comprehensive understanding of the intersections between traditional Indian wisdom and contemporary forensic science, emphasizing the role of ancient knowledge in modern-day applications.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will learn about basics of anthropology and its application in the court of law.	R
2	They will know about determination of age, sex, race, ethnicity etc from skeletal remains	U
3	They will know about various personal identification techniques and forensic importance.	Ap
4	They will learn about the role of odontology in personal identification, collection, preservation and forensic analysis of bite marks	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO2	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO3	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO4	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 380- Practicals Based On Forensic Anthropology

Unit No.	Topics	No. of Lectures	CO No.
I	• To perform osteometric measurements on long bones		I
II	• Determination of sex from Skull Sutures & Pelvis		II
III	• To perform somatometric measurements on livings- Height vertex, Head length, Head breadth, Foot length, Foot breadth, Nasal height. Nasal breadth,External bi-orbital breadth, Internal bi-orbita breadth, Bigonial breadth and Bizygomatic breadth • To perform craniometric measurements on skull		III
IV	• Determination of age from teeth & Skull		IV

Recommended Readings:

- Bernard H.R. (1940). Research Methods in Cultural Anthropology. Newbury Park: Sage Publications.
- Davis K. (1981). Human Society. New Delhi: Surjeet Publications.
- Ember C. R. et al. (2011). Anthropology. New Delhi: Dorling Kindersley.
- Steven N. Byers Introduction to Forensic Anthropology. Allyn & Bacon.
- Karen Ramey Burns, Forensic Anthropology Training Manual, The (2nd Edition) Prentice Hall
- Debra Komar Jane Buikstra, Forensic Anthropology: Contemporary Theory and Practice OxfordUniversity Press, USA
- M. Anne Katzenberg (Editor), Shelley R. Saunders, Biological Anthropology of the HumanSkeleton, Wiley-Liss
- Tim D. White, Michael T. Black, Pieter A. Folkens, Human Osteology, Third Edition , Academic Press

M.Sc. (Forensic Science) Semester-III

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	III
Course Code	**Course Title**		**Course Type**
FSL 390	Practicals Based on Forensic Microbiology and Immunology		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-
Maximum Marks	**CIA**		**ESE**
100	30		70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce hands on training in basic microbiology and immunology techniques used in analysis of forensic samples.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will understand the types, nature and importance of microbes.	R
2	Students will understand application of microbes in forensic investigation.	U
3	Students will understand basics of various aspects of human immunology.	Ap
4	Students will understand the practical application of immunology in development of forensic investigation.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO2	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO3	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO4	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailedsyllabus of : FSL 390- Practicals Based on Foremsic Microbiology and Immunology

Unit No.	Topics	No. of Lectures	CO No.
I	• Hand on practices of sterilization techniques. • Culture Media preparation and sterilization.		I
II	• Four Flame streaking techniques. • Bacterial Culture.		II
III	• MTT based toxicity assay. • Single and double immunodiffusion.		III
IV	• ELISA. • Animal Cell Culture.		IV

Recommended Readings:

- Kindt, T. J., Goldsby, R. A., Osborne, B. A., & Kuby, J. (2006). *Kuby Immunology*. New York: W.H.Freeman.
- Paul, W. E. (1993). *Fundamental Immunology*. New York: Raven Press
- AK Abbas, (2015), *Cellular and Molecular Immunology*. 8th Edition, Elsevier.
- Ananthanarayan and Paniker, *Textbook of Microbiology*, 8th Edition.
- Baveja CP, (2001) *Textbook of Microbiology*. 5th Ed., Mcgraw Hill Education

M.Sc. (Forensic Science) Semester-III

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	III
Course Code	**Course Title**		**Course Type**
FST 400	Forensic Dermatoglyphics and Questioned Documents		GE
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce students with principle of questioned documents, classification, handwriting identification, analysis of forged documents, fingerprints development and identification and tools used in questioned documents.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will able to learn the importance of examining questioned documents and Fingerprint examination in crime cases. The importance of detecting frauds and forgeries by analyzing questioned documents.	R
2	Students will able to learn the Fundamentals of fingerprints analysis and comparison of Fingerprints for Identification Purpose	U
3	Students will able to learn Natural variations and fundamental divergences in handwritings. Examination of counterfeit Indian currency notes, passports, visas and stamp papers, seal, rubber & other mechanical impressions.	Ap
4	Students will able to learn different tools and techniques used development of latent fingerprint on Crime Scene.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO2	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO3	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO4	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed syllabus: FST 400- Forensic Dermatoglyphics and Questioned Documents

Unit No.	Topics	No. of Lectures	CO No.
I	Fingerprints, History and development of finger prints as a science for personal identification, Different patterns of fingerprint, Henry Classification.		I
II	Types of fingerprints at scene of crime, Location and preservation of fingerprints, Development of latent prints, Matching of fingerprints.		II
III	Questioned document, Types of Forensic Documents, Collection, handling, preservation, marking and forwarding of documents, Basic tools needed for Forensic Document Examination.		III
IV	Principle of handwriting identification; Hand writing and its characteristics, Factors affecting hand writing. Samples for comparison and comparison of handwriting, Disguised and Indented writings and their detection. Types of forgeries.		IV

Recommended Readings:

- Ordway Hilton; Scientific Examination of Questioned Documents, Elsevier, NY
- Albert S. Osborn; Questioned Documents, 2nd Ed., Universal Law Pub., Delhi
- Wilson R. Harrison; Suspect Documents Their Scientific Examination, Universal Law Pub. Delhi Indian Reprint
- Morris Ron N; Forensic Handwriting Identification, Acad .Press, London (2001)
- Moenssens; Finger Prints Techniques, Chitton Book Co. Philadelphia, NY (1975).
- Chatterjee S.K.; Speculation in Finger Print Identification, Jantralekha Printing Works, Kolkata (1981)
- Cowger, James F; Friction ridge skin- Comparison and Identification of fingerprints, CRC Press, NY (1993)
- Cook Nancy; Classifying Finger Prints, Innovative learning Pub. Mento Park (1995)

M.Sc. (Forensic Science) Semester-IV

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	IV
Course Code	**Course Title**		**Course Type**
FST 411	Forensic Photography		DSE
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce the students with basic of photography, lenses, videography, digital photography and crime scene photography.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will know about various component of camera and their functions.	R
2	Students will learn about rules and regulation of photography and videography of various crime scene.	U
3	They will also know about basics of digital photography and recent advancement in photographic techniques.	Ap
4	They will also know about forensic significance of photography in document examination and pattern evidence analysis.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	2	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO2	3	2	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO3	3	2	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO4	3	2	1	-	2	3	3	3	3	1	1	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 411 - Forensic Photography

Unit No.	Topics	No. of Lectures	CO No.
I	Photography definition and scope, Introduction to Camera, lens, shutter depth of film		I
II	Videography, Videography for fire and crime scene, motor vehicle accident scene, surveillance photography and photographic aspects of injuries.		II
III	Basics of Digital photography, digital imaging, resolution, digital cameras, Monitors and scanners.		III
IV	Crime scene photography, photography of foot and fingerprints, Significance of photography in document examination, Photography in hit and run cases.		IV

Recommended Readings:

- David R Redsicker: The practical methodology Forensic photography: (second edition) CRC press
- Duckworth J E: Forensic photography. Springfield I L. Charles C Thomas
- Samsone SJ: Modern photography for police and fireman, Cincinna TI OH WH. Anderson Company. 1971
- Ellen David; Questioned Documents- Scientific Examination, Taylor & Francis, Washington (1997)
- H.L. Blitzer and J.Jacobia; Forensic Digital Imaging and Photography, Academic Press (2002)

M.Sc. (Forensic Science) Semester-IV

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	IV
Course Code	**Course Title**		**Course Type**
FST 412	Recent Advancement In Forensic Biology		DSE
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

These learning objectives aim to develop a comprehensive understanding of the intersections of advance knowledge of various field of biology.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Student will learn about advance knowledge of hair as forensic evidence.	R
2	They will learn human skeleton system and its application in forensic Science.	U
3	They will apply knowledge of anthropology to determine the individuals identification.	Ap
4	They will also learn about the knowledge of zoology and entomology and its application in forensic science.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO2	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO3	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO4	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed syllabus: FST 412 – Advanced Forensic Biology

Unit No.	Topics	No. of Lectures	CO No.
I	Hair- Introduction and forensic Evidential Value; Morphology, Anatomy, Chemistry of Hair; The scene of occurrence; Collection, sampling and preservation of Hair; Human Hair Characteristics: Cuticle, Cortex, Medulla, Diameter, Racial Group Features; Somatic origin of human hair; Morphological Examination: Ends, Root present/ absent ,Tapered tips (uncut) Rounded or abraded , Square cut/ Angular cut Crushed/ Burned, Distal ends, BrokenMicroscopic Examination of Hair; Drug analysis in Hair; Analytical methods of analysis; Elemental analysis of Hair and its forensic aspects; Morphological changes of hairs by Disease; Pigmentation, Color treatments; Temporary dyes, rinses, sprays, gels, mousses, Bleaches or lighteners, Hair spray and Hair gel; mtDNA Profiling of Hair and its forensic significance		I
II	Forensic Osteology: Basic Biology of human skeleton; Number and types of bones in human body; Collection, packaging and storage of human skeletal remains; Distinguishing Humans from other non- human skeletal remains. Age estimation from Skeleton: (Earlier years): Prenatal ossification, Postnatal appearance and union of centers ossification; Age estimation from Skeleton: (Later years): Cranial suture closure, pubic symphysis.Sex Determination from Skeleton: On the basis of skull, Pelvis and long bones.		II
III	Calculation of stature of long bones: Studies on stature reconstruction in various population groups. Use of fragmentary long bones in stature reconstruction. Racial differences in human skeleton Other techniques of identifying skeletal remains: Facial reconstructions, Cranio facial superimposition, Video superimposition,		III
IV	**Forensic Entomology and Zoology**: Diatoms -Types morphology, methods of isolation from different tissue and forensic significance in drowning cases, Microorganism encountered in biological warfare **Forensic Botany**: Identification and comparison of various types of wood, timber varieties, seeds and leaves; Study and identification of pollen grains and its forensic Importance		IV

Recommended Readings:

- Robertson, J. (1996): Forensic Examination of Hair. Taylor and Francis, USA.
- Goutam Shubhra. ; An Introduction to Forensic Hair Examination; Selective and Scientific Book ,New Delhi
- Fazekas, I Gy; Forensic m foetal Osteology, Akademiai Kiado(1978)
- Singh, Inderbir; Human Osteology, Jayee Brothers, (2004)
- Joseph, J; Human Osteology, Jaypee Brothers, (1996)
- Marion, Krogman Wilton; Human skeleton in forensic medicine, Charles C Thomas, (1986)
- Singh, Inderbir; Textbook of human osteology, Jaypee Brothers, (2002)
- P.L. Williams & R. Warwick; Gray' Anatomy, Churchill Livingston, London,(1980)
- Krogman, W.M.. The Human Skeleton in Forensic Medicine, Chalres C Thomas, Springfield, (1973)

- K.J. Reich; Forensic Osteology: Advances in the identification of Human remains, Charles C Thomas, (1998)
- William M. Bass;Human Osteology: A Laboratory and Field Manual,Missouri Archaeological Society (1995)
- Dorothy Gennard ,Forensic Entomology: An Introduction ,Willey
- Byrd J H & Castner J L; Forensic Entomology, The Utility of Arthropods in legal Investigation, CRC Press, USA (2000)

M.Sc. (Forensic Science) Semester-IV

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	IV
Course Code	**Course Title**		**Course Type**
FST 413	Recent Advancement In Forensic Serology & Immunology		DSE
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce students with concept of forensic uses of body fluid like blood, urine and saliva, basics of biochemistry, serological techniques and wildlife forensics.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	student will learn about blood evidence and its forensic importance in details	R
2	They will know about blood pattern analysis and its forensic significance	U
3	They will also know about various tests performed for the analysis of various serological evidences.	Ap
4	They will also know about basic of immunology, antigen antibody reaction and its forensic significance.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO2	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO3	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO4	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 413 - Recent Advancement in Forensic Serology & Immunology

Unit No.	Topics	No. of Lectures	CO No.
I	Blood: Composition and functions, collection and species identification, Structure and function of serum proteins, Haemoglobin and its variants, Haptoglobins. Blood groups – history, biochemistry and genetics of ABO, Rh, Mn and other systems. Methods of ABO blood grouping (absorption-inhibition, mixed agglutination and absorption elution) from blood stains and other body fluids/stains viz. menstrual blood, semen, saliva, sweat, tear, pus, vomit, hair, bone, nail. Secretors and non-secretors. Blood groups that make racial distinctions.		I
II	Analysis of Blood in Forensic Serology: Identification of blood, Chemical test for Blood identification, Species Origin determination in Blood Stains. Blood Pattern Analysis: History of Bloodstain Pattern interpretation, Properties of human blood, Size, Shape and Directionality of bloodstains, Spattered blood, other Bloodstain Patterns, Interpretation of Bloodstain on clothing and footwear.		II
III	Forensic Identification of Biological Fluids and Stains: Composition of Semen and morphology ofspermatozoa, identification of Semen, Qualitative Assays of seminal fluids: Acid phosphatase,microscopic identification of Spermatozoa, Oligospermia and Azoospermia. Identification ofAzoospermia Semen stains, Prostate specific Antigen (PSA, P30) as an indicator of Semen. Saliva: Composition, Identification tests		III
IV	Immunology: Immune system, immune response, innate and acquired immunity and antigens,Immunoglobulin: Types, physio-chemicalproperties and function, Rising of antisera. Lectins: Forensicsignificance, buffers and serological reagents, methods of sterilization employed forserological work.Antigen-Antibody Reactions: Precipitation, agglutination, complement, neutralization, immunofluorescence		IV

Recommended Readings:

- Working Procedure Manual Serology, DFS, New Delhi.
- Danniel P. Stites, Abba I. Jerr, Tristram G. Parstow Medical immunology, Ninth edition; Prentice HallInternational Inc. 1997.
- Saferstein, R. (1982): Science Handbook, Vol. I, II, & III, Prentice Hall New Jersey.
- Stern, C. (1964) : Principles of Human Genetics, Freeman, California.
- Beerman, K.E.: Blood Group Serology, Churchill, and Lincoin, P.J. (1988)
- Race, R.R, and Sanger, R. (1975) : Blood Groups in Man. Blackwell Scientific, Oxford.
- Gilblet, E. (1969) : Markers in Human Blood, Davis, Pensylvania
- Culliford, B.E. (1971) The Examination and Typing of Blood Stains, US Deptt. of Justice.
- Chowdhari, S. (1971) : Forensic Biology, B P R & D, Govt, of India.
- Dunsford, I and Bowley, C. (1967) : Blood Grouping Techniques, Oliver & Boyd, London.

M.Sc. (Forensic Science) Semester-IV

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	IV
Course Code	**Course Title**		**Course Type**
FST 421	Recent Advancement In Forensic Physics		DSE
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce students about concept of glass analysis, tool mark analysis, microscopic examination of paints and speaker identification.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will learn about soil and glass evidence and their analysis.	R
2	They will know about tool marks, their identification and comparison	U
3	They will also know about microscopic and instrumental analysis of paint evidences.	Ap
4	They will have knowledge of speaker identification and tape authentication for forensic purpose.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO2	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO3	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3
CO4	3	-	1	-	2	3	3	3	3	1	1	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 421 - Recent Advances in Forensic Physics

Unit No.	Topics	No. of Lectures	CO No.
I	Soil as evidence and challenges to forensic scientist, Composition and types of soil, Methods of examination of Preliminary discrimination methods and Density gradient tube technique. Glass: Types of glass and their composition, examination of glass fractures under different conditions, determination of direction of impact: cone- fracture, rib marks, hackle marks, backward fragmentation, colour and fluorescence, physical matching, density comparison, physical measurements, Refractive index by Refractometer, Elemental analysis, Interpretation of glass evidence.		I
II	Tool marks: Types of tool marks: compression marks, striated marks, combination of compression and striated marks, repeated marks, class characteristics and individual characteristics, tracing and lifting of marks. Physical, chemical and instrumental methods of examination of strings/ropes, fibers, threads &fabrics, Wires/cables, seals, counterfeit coins, Physical match of broken objects. Restoration of erased/obliterated marks in different surfaces.		II
III	Forensic analysis of paint: Macroscopic & instrumental analysis like IR spectroscopy, Raman spectroscopy & X-ray diffraction, elemental analysis, Interpretation of Paint evidence.		III
IV	Speaker identification and tape authentication: Introduction to techniques of pattern recognition and comparison. Legal aspects. Principle and forensic application of Brain fingerprinting, Narco analysis and Lie detection.		IV

Recommended Readings:

- C.E.O Hara and J.W. Osterburg; An Introduction to Criminalistic, Indiana University Press, Blomington.
- Raymond C Murray & John C.F Tedrew; Forensic Geology, Prentice Hall NJ
- Working Procedure Manual : Physics DFS, New Delhi Publication (2000)
- B. Caddy; Forensic Examination of Glass and Paints Analysis and Interpretation ISBN
- Goutam, S and Goutam, M.P..: Physical Evidences-Introduction & Bibliography on their Forensica nalysis. Shiv Shakti Book Traders, New Delhi
- James Michael Curran, Tachia Natilie Hicks and John S.Buckleton; Forensic Interpretationof GlassEvidence, CRC Press (2000)
- David A. Crown; The Forensic Examination of Paints and Pigments, Toylor & Francis,
- Jay A.Siegel, Pekka J Saukko and Geoffrey C. Kooupfer; Encyclopedia of Forensic Science,
- Robertson, J and Grieve, M, Forensic Examination of Fibers, CRC.
- Philip Rose; Forensic Speaker Identification, Taylor and Francis, London.
- Bengold & Nelson Moryson; Speech and Audio signal processing, John Wiley & Sons, USA (1999)

M.Sc. (Forensic Science) Semester-IV

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	IV
Course Code	**Course Title**		**Course Type**
FST 422	Recent Advancement In Forensic Ballistics		DSE
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce the students with firearms, ammunition, GSR analysis, Explosive classification and its analysis, Firm Arm Injuries.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will learn about various types of firearms, it components, and other characteristics.	R
2	They will know about internal and terminal ballistics in detail.	U
3	They will also have an idea of gunshot residue and their examination.	Ap
4	They will also know about various injuries caused by firearms	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	3	2	2	3	3	3	3	3	1	1	3	3	2	3	3
CO2	3	2	3	2	3	3	3	3	3	1	1	3	3	2	3	3
CO3	2	2	2	2	3	3	3	3	3	1	1	3	3	2	3	3
CO4	3	3	3	2	3	3	3	3	3	1	1	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 422- Recent Advanced Forensic Ballistics

Unit No.	Topics	No. of Lectures	CO No.
I	Firearms, Definition, History, classification and characteristics of firearms. Examination and identification of fire arms. Identification of origin, improvised/ country-made/ imitative firearms and their constructional features, Velocity and pressure characteristics under different conditions; various types of bullets and compositional aspects, latest trends in their manufacturing and design		I
II	Internal Ballistics: Definition, ignition of propellants, shape and size of propellants, manner of burning, Piobett's law, pressure space curve, shot start pressure. various factors affecting the internal ballistics: All burn point, velocity, space curve Le Due's formula, muzzle velocity, factors affecting muzzle velocity, theory of recall External Ballistics: Definition-trajectory drop in the flight of the projectiles force of gravity air resistance-base drag, Yaw, shape of bullet, (Spherical ball, Cylindrical-conical, flat nose, round nose etc), effective range, extreme range. Terminal Ballistics: Definition, behavior of various type of bullets on the target, remaining velocity, stopping power, Ricochet.		II
III	Different types of marks produced during firing process on cartridge-firing pin marks, breech face marks, chamber marks, extractor and ejector marks and on bullet number/direction of lands and grooves, striation marks on the lands and grooves. Class and individual characteristics. Determination of range of fire-burring, scorching, blackening, tattooing and metal fouling, shots dispersion and GSR distribution, time of firing, different method employed, and their limitations Analysis of Gunshot Residues: Mechanism of formation of GSR.		III
IV	Firearm injuries: Evaluation of injuries caused due to shot-gun, rifle, handguns and country made firearms, methods of measurements of wound ballistics parameters, post-mortem and ante mortem firearm injuries; Report writing and expert's evidence.		IV

Recommended Readings:

- Arms Act, 1959. And Arms Rule, 1962.
- Working Procedure Manual: Ballistics, DFS New Delhi Publication,20005.
- Bhattacharyya C.N., (2000) Particle Analysis for Detection of Gunshot Residues – A State-of-theArt Technique, The Indian Police Journal, BPR&D, Vol.XLVII, No. 4, pp. 113-127
- Burrad, G., (1951) The Identification of Firearm and Forensic Ballistics, Herbert, Jenkins, London.
- Kumar, K., (1987) Forensic Ballistics in Criminal Justice, Eastern Book Co
- Davis, J.E., (1958) An Introduction to Tool marks, Firearms and the Stria graph Charles C 7. Thomas, Springfield, Illinois, USA.
- Di Maio, J.M., (1985) Gunshot Wounds, Elsevier, USA.
- Feigl, F., (1962) Spot Tests in Inorganic Analysis, Elsevier Publishing Co., Netherlands.

M.Sc. (Forensic Science) Semester-IV

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	IV
Course Code	**Course Title**		**Course Type**
FST 423	Recent Advancement In Forensic Questioned Documents and Fingerprints		DSE
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce students with principle of questioned documents, classification, handwriting identification, analysis of forged documents, fingerprints development and identification and tools used in questioned documents.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will learn about various types of questioned document and their examination.	R
2	They will know about recent advancement in the tools and techniques used for the examination of questioned document.	U
3	They will also know about analysis and comparison of handwriting and signature samples.	Ap
4	They will also learn about basic principles of photography and recent advancement in digital photography.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	1	2	1	3	2	1	1	2	3	3	3	3	2	3	3
CO2	3	1	3	1	3	2	1	1	2	3	3	3	3	2	3	3
CO3	2	2	2	2	3	2	1	1	2	3	3	3	3	2	3	3
CO4	3	1	3	2	3	2	1	1	2	3	3	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FST 423- Recent Advancement in Questioned Documents and Fingerprints

Unit No.	Topics	No. of Lectures	CO No.
I	Questioned Document–Definition, Nature and History of document examination, Classification of Forensic documents-Admitted, Request and Typescript specimens, Holographic documents, Care and Handling of documents, Basic tools needed for Forensic Document Examination - Hand lens, Stereo microscope, Electrostatic detection device (EDD), Video Spectral Comparator (VSC)		I
II	Handwriting : Principle, General qualities, Writing habits, Individual Characteristics; Factors that causes changes in Handwriting, Systematic Examination of Handwriting; Examination of signatures, Characteristics of genuine and forged signatures; Alteration of Documents, Secret writings, Anonymus writing, Disguised writing, indented writings, Charred documents.		II
III	Forgery: Various types of forgery and their examination, Determination of sequence of strokes; Age of Documents, Examination and Identification of Paper, Ink, Typescripts, seal, rubber, Carbon copies & other mechanical impressions, counterfeiting and examination of forged currency notes, Presentation of evidence in court.		III
IV	Photography; Basic principles and techniques of Black & White and colour photography, Cameras and lenses, developments and printing, Different kinds of developers and fixers, Linkage of Cameras and Film negatives, Digital photography, digital water marking & digital imaging, Photogrammetry and videography, crime scene and laboratory photography IR, UV and Portrait photography, Recent developments in photography.		IV

Recommended Readings:

- Ordway Hilton; Scientific Examination of Questioned Documents, Elsevier, NY
- Albert S. Osborn; Questioned Documents, 2nd Ed., Universal Law Pub., Delhi
- Charles C. Thomas; I.S.Q.D. Identification System for Questioned Documents, willy Prior Bates Springfield,Illinois, USA
- Wilson R. Harrison; Suspect Documents Their Scientific Examination, Universal Law Pub. Delhi IndianReprint
- Goutam, Shubhra and Goutam M.P. Physical Evidences- Introduction and Bibliography on their forensicanalysis,Shiv Shakti Book Traders, New Delhi.
- Morris Ron N; Forensic Handwriting Identification, Acad .Press, London (2001)
- Lerinson Jay; Questioned Documents, Acad Press, London
- Lerinson Jay; Questioned Documents, Acad Press, London
- Mcmenamin, G. R; Forensic Linguistics- Advances in Forensic Stylistics, CRC

M.Sc. (Forensic Science) Semester-IV

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	IV
Course Code	**Course Title**		**Course Type**
FSL 430	Practicals Based on Recent Advancement In Forensic Biology		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

These learning objectives aim to develop a comprehensive understanding of the intersections between traditional Indian wisdom and contemporary forensic science, emphasizing the role of ancient knowledge in modern-day applications.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Student will learn about advance knowledge of hair as forensic evidence.	R
2	They will learn human skeleton system and its application in forensic Science.	U
3	They will apply knowledge of anthropology to determine the individuals identification.	Ap
4	They will also learn about the knowledge of zoology and entomology and its application in forensic science.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	1	2	1	3	2	-	-	3	1	1	3	3	2	3	3
CO2	3	1	3	1	3	2	-	-	3	1	1	3	3	2	3	3
CO3	2	2	2	2	3	2	-	-	3	1	1	3	3	2	3	3
CO4	3	1	3	2	3	2	-	-	3	1	1	3	3	2	3	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed syllabus of : FSL 430- Practicals Based on Recent Advancement In Forensic Biology

Unit No.	Topics	No. of Lectures	CO No.
I	• Morphological examination of Human and Animal Hair • Examination & Comparison of Human Hair originated from different body parts.		I
II	• Determination of sex from Skull Sutures & Pelvis • Determination of age from teeth & Skull.		II
III	1. To perform craniometrical measurements on skull 2. Examination of diatoms		III
IV	• Microscopic Examination of Pollen Grains		IV

Recommended Readings:

M.Sc. (Forensic Science) Semester-IV

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	IV
Course Code	**Course Title**		**Course Type**
FSL 440	Practicals Based on Recent Advancement In Questioned Documents & Finger prints		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objective of the course is to introduce students with principle of questioned documents, classification, handwriting identification, analysis of forged documents, fingerprints development and identification and tools used in questioned documents.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Students will learn about various types of questioned document and their examination.	R
2	They will know about recent advancement in the tools and techniques used for the examination of questioned document.	U
3	They will also know about analysis and comparison of handwriting and signature samples.	Ap
4	They will also learn about basic principles of photography and recent advancement in digital photography.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	2	2	3	3	2	2	1	3	1	1	3	3	2	2	2
CO2	3	2	3	3	3	2	2	1	3	1	1	3	2	2	3	2
CO3	2	2	2	2	3	2	2	1	3	1	1	3	3	3	3	2
CO4	3	2	3	2	3	2	2	1	3	1	1	3	2	2	2	2

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed syllabus: FSL 440- Practicals Based On Recent Advancement in Question Documents and Fingerprints

Unit No.	Topics	No. of Lectures	CO No.
I	• Examination of ink by TLC • Examination of paper • Examination of rubber stamp		I
II	• Examination of typescripts and printed matters • Examination of photocopy documents for machine defect marks. • Detection and decipherment of alterations, additions and over writing		II
III	• Detection of forgeries including traced and simulated forgery and built up documents. • Decipherment of indented writings, secret writings and charred documents		III
IV	• Examination of security documents Currency notes, Stamp Papers and lottery tickets • Examination of erasures-mechanical and chemical erasures		IV

Recommended Readings:

M.Sc. (Forensic Science) Semester-IV

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	IV
Course Code	**Course Title**		**Course Type**
FSL 450	Dissertation + Viva		Core
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
16	-	-	-
Maximum Marks	**CIA**		**ESE**
100	30		70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

The objectives of this course are to prepare the students to adapt to the research environment and understand how crime scene samples are executed in forensic science/ research laboratory. It will also enable students to learn practical aspects of research related to criminal investigation and train students in the art of analysis and report/ thesis writing.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	The students should have educated to adapt to the research environment and understand how projects are executed in a research laboratory. It will also enable students to learn practical aspects of research and train students in the art of analysis and thesis writing	R
2	The students will be able to Students should be able to learn how to select and defend a topic of their research, how to effectively plan, execute, evaluate and discuss their experiments.	U
3	Students should have In-depth knowledge of the chosen area of research as well as have capability to create, analyse and critically evaluate different technical solutions, ability to conduct research independently to perform analytical techniques/experimental methods. The student should have skilled in project management skills, report writing skills, Problem solving skills, communication and interpersonal skills	Ap
4	The students will be able to learn experimental details used in criminal investigation system to solve the criminal cases.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	2	3	1	2	2	2	1	3	1	1	1	3	2	2	3
CO2	2	3	3	1	2	2	2	1	3	1	1	1	3	2	2	3
CO3	2	3	3	1	2	2	2	1	3	1	1	1	3	2	2	3
CO4	2	3	3	1	2	2	2	1	3	1	1	1	3	2	2	3

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed Syllabus: FSL 450 : Dissertation + Viva

Unit No.	Topics	No. of Lectures	CO No.
I	**Planning & performing experiments** Based on the project proposal submitted in this semester, students should be able to plan, and engage in, an independent and sustained critical investigation and evaluate a chosen research topic relevant to Forensic Science and Society. They should be able to systematically identify relevant theory and concepts, relate these to appropriate methodologies and evidence, apply appropriate techniques and draw appropriate conclusions to criminal cases. Senior researchers should be able to train the students such that they can work independently and are able to understand the aim of each experiment performed by them which directly involved in criminal investigation system. They should also be able to understand the possible outcomes of each experiment.		I
II	**Thesis writing** At the end of their project, thesis has to be written giving all the details such as aim, methodology, results, discussion and future work related to their project. Students may aim to get their research findings published in a peer-reviewed journal. If the research findings have application-oriented outcomes, the students may file patent application.		II
III			III
IV			IV

M.Sc. (Forensic Science) Semester-IV

Program	Subject	Year	Semester
M.Sc.	Forensic Science	2	IV
Course Code	**Course Title**		**Course Type**
FST 460	Mobile Forensic		SEC
Credit	**Hours Per Week (L-T-P)**		
	L	T	P
02	02	1	-

Maximum Marks	CIA	ESE
100	30	70

*** L- Lecture, T- Tutorial, P- Practical**

Learning Objective (LO):

These learning objectives aim to his course covers mobile forensics techniques, including data extraction methods, evidence preservation, analysis of mobile data (calls, messages, multimedia, location), mobile security (encryption, passwords, biometrics), and advanced methods like cloud-based forensics and AI, with a focus on reporting and presenting forensic findings.

Course Outcomes (CO):

CO No.	Expected Course Outcomes At the end of the course, the students will be able to:	CL
1	Understand the definition, importance, types of mobile devices and operating systems, hardware components, software architecture, file systems, and the significance of the chain of custody and evidence preservation in mobile forensics.	R
2	Understand different data acquisition methods such as manual, logical, physical, and cloud-based extraction, and explore the tools used in mobile forensics like Oxygen Forensics, Magnet AXIOM, and Cellebrite, along with data integrity verification through hashing.	U
3	Develop skills to analyze mobile data such as call logs, messages, multimedia, deleted data, and social media, along with location data analysis and its forensic implications.	Ap
4	Mobile Network Analysis and Security Learn how to analyze mobile network data such as CDRs, SMS, MMS, browsing history, and emails, while understanding encryption techniques, password protection, and biometric authentication in mobile security.	An

CL : Cognitive Levels (R-Remember; U-Understanding; Ap-Apply; An-Analyze; E-Evaluate;

CO-PO/PSO Mapping for the course:

PO / CO	POs											PSO				
	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5
CO1	3	3	1	3	2	1	3	1	3	1	1	3	3	2	2	2
CO2	3	3	1	3	2	1	3	1	3	1	1	3	2	2	2	2
CO3	3	3	1	3	2	1	3	1	3	1	1	3	3	3	3	2
CO4	3	3	1		2	1	3	1	3	1	1	3	2	2	3	2

"3"–Strong;"2"–Moderate;"1"-Low;"-"No Correlation

Detailed syllabus: FST460- Mobile Forensics

Unit No.	Topics	No. of Lectures	CO No.
I	Definition and importance, Types of mobile device & its Operating systems, Hardware components, Software, Architecture and file systems, Chain of Custody and evidence preservation.		I
II	Types of data acquisition & tools: Manual extraction, logical Extraction, physical extraction and Cloud-based extraction, Oxygen Forensics, Magnet AXIOM, Cellebrite ,Data Integrity and verification- Hashing methods.		II
III	Analysis of Mobile data: Call logs, messages & contacts, recovering Deleted Data, Analysis of multimedia, investigation Social Media & messaging apps. Location data analysis(GPS).		III
IV	Mobile Netwok Analysis and secuirty: CDRs,SMS,MMS,Browers and email Forensic, analysisng browing history and coockies, Encriptions techniqus , Password,Patterns,Biometric Authotication.		IV

Recommended Readings:

- **"Mobile Forensics: Advanced Investigative Strategies" by Lee Reiber**
- Android Forensics: Investigation, Analysis and Mobile Security for Google Android" by Jonathan Zdziarski
- Mobile Device Forensics: A Guide for Digital Investigators" by Robert J. McGrath
- "Practical Mobile Forensics" by S. S. P. Yadav, Sudhir V. U
- "iOS Forensics: Mobile Device Security and Forensics" by Nick S. S.
- "Mobile Forensics Field Guide" by Craig Ball
- Computer Forensics: Investigating Networked Computers" by EC-Council
- Handbook of Digital Forensics and Investigation" edited by Eoghan Casey