

Course curriculum

SEMESTER I

Course Code	Course Name	L	T	P	C
FRS101	INTRODUCTION TO FORENSIC SCIENCE & CRIMINOLOGY	3	1	0	4

Unit I: Development and growth of Forensic Science

Introduction to Forensic science– Definition, Laws and Principles, basics of Forensic Science; Historical development and scope of Forensic Science in India; Branches of Forensic Science, its utilization at the scene of crime and in the courts. Forensic Science Laboratory-CFSL, SFSL & RFSL, Role of Forensic expert.

Unit II: Crime & Criminology

Definition, elements, nature, type of crime (Hate crimes, organized crimes and public disorder, domestic violence and workplace violence, White collar crimes), classification and theories of criminology.

Unit III: Criminal Justice System

Introduction to Criminal Justice System; Different agencies involved in crime detection, First Information Report, cognizable and non-cognizable offences, Introduction to IPC, IEA and CrPc.

Unit III: Case Study

Aarushi Murder Case, Sheena Bora Murder Case, Ted Bundy serial murder case: role of forensic Investigation, Problem associated with investigation, Limitations of forensic expert and judgement.

References:

- Bodziak, W. (2000). Footwear Impression Evidence: Detection, Recovery and Examination 2nd edn CRC Press Boca Raton FL.
- DeForest, P. R., Gaensslen, R. E., & Lee, H. C. (1983). Forensic Science: An Introduction to Criminalistics, McGrawHill. Inc., New York.
- Fisher, B. A. J., & Block, S. (1991). Techniques of Crime Scene Investigation, CRC Pres. Boca Raton. Ann Arbor, London, Tokyo, 25-84.
- James, S. H. And Nordby, J. J. (Eds), Forensic Science - An Introduction to Scientific and Investigative Techniques, CRC Press, London, 2003.
- Eckert, W. G., & James, S. H. (Eds.). (1998). Interpretation of bloodstain evidence at crime scenes. CRC press.

Course Code	Course Name	L	T	P	C
FRS102	BASIC CHEMISTRY	3	0	1	4

Unit I: Basic Concepts of Chemistry

Dalton's atomic theory, atomic and molecular masses, isotopes and isobars, molar mass, percentage composition, chemical reactions, stoichiometry and calculations based.

Unit II: Atomic Structure

Discovery of Electrons, protons, electron, neutrons, atomic models, shells, sub-shell, dual nature of matter and light, de-Broglie relationship, Heisenberg uncertainty principle, concept of orbitals, quantum numbers, shapes of s, p and d orbitals, Aufbau principle, Pauli exclusion principle, Hund's rule, electronic configuration of atoms.

Unit III: Radioactivity

Radioactivity, types and properties of radiation, detection and measurement of radioactivity, radioactive decay, the Group Displacement Law, radioactive disintegration series, rate of decay, half-life, nuclear reactions, mass defect, carbon dating.

Unit IV: Basic introduction of inorganic chemistry

Types of bonds, hybridization and shape of simple molecules and ions, Valence Bond Theory and its limitations, Molecular Orbital Theory, Coordination complexes, and their nomenclature.

Unit V: Basic introduction of organic chemistry

Types, classification, DBE/IHD, hybridization, representation the gross structural formulae, factors influencing electron availability, intermolecular forces explaining physical properties, aromaticity, reaction intermediates, nucleophilic substitution reactions and elimination reactions.

Unit VI: Basic Chemistry Practical

A. Quantitative Analysis: To determine the strength of a given solution of sodium hydroxide by titrating it against the standard solution of oxalic acid.

- a) Determination of acetic acid in commercial vinegar using NaOH.
- b) Determination of alkali content – antacid tablet using HCl.
- c) Estimation of calcium content in chalk as calcium oxalate by permanganometry.

B. Qualitative analysis anions and cations in salts.

References:

- Ebbing, D., & Gammon, S. D. (2016). General chemistry. Cengage Learning.
- W.R. Robinson, J.D. Odom, and H.F. Holtzclaw, Jr., (1997) General Chemistry, 10th Ed, Boston.
- Pagel, W. (1962). A History of Chemistry. JR Partington.(4 vols.) London: Macmillan... Co., 1961. Vol. II.
- Eding Darrel D. (1970) Introductory Chemistry.

SECOND SEMESTER

Course Code	Course Name	L	T	P	C
FRS105	CRIME SCENE MANAGEMENT	2	0	2	4

Unit I: Crime Scene & Physical Evidence

Defining a crime scene, Importance, location, and processing of crime scene. Types of Crime Scene: Indoor and outdoor, Primary, and secondary and crime scenes based on size of evidence.

Physical evidence: types, Search, Collection, and preservation of physical evidence, packing and forwarding of evidence.

Unit II: Crime Scene Management

Crime scene Management – initial response, role of first responding officer, duty management; Role and qualities of an Investigating officer, Role of forensic scientists, forensic doctors, fire brigade and judiciary Securing and Recording the Crime Scene.

Protecting a scene of crime – various steps involved, contamination issues. Recording a crime scene: Crime Scene Survey, Forensic Photography, sketching, field notes, handling clues, modern aids. Crime Scene Reconstruction and its utility, chain of custody.

Unit III: Forensic Examination of Fiber

Classification of Fibers, Collection, and preservation of fiber evidence. Preliminary examination, Identification, and comparison of manufactured fibers (Microscopic examination, Dye composition, Chemical composition, other properties for examination), Significance of match.

Unit IV: Practical

1. Investigation and sketching of indoor and outdoor scene of crime using triangulation method.
2. Investigation and sketching of indoor and outdoor scene of crime using baseline method.
3. Collection, packing and forwarding of different types of evidences.
4. Analysis of different types of fibres.

References:

1. Bodziak, W. (2000). Footwear Impression Evidence: Detection, Recovery and Examination 2nd edn CRC Press Boca Raton FL.
2. DeForest, P. R., Gaensslen, R. E., & Lee, H. C. (1983). Forensic Science: An Introduction to Criminalistics, McGrawHill. Inc., New York.
3. Fisher, B. A. (2003). Techniques of crime scene investigation. crc Press.
4. James, S. H., & Nordby, J. J. (2002). Forensic science: an introduction to scientific and investigative techniques. CRC press.
5. James, S., and Eskerc, W., Interpretation of Blood Stain Evidence at Crime Scenes, (2ndEdn) CRC Press, Boca Raton, Florida, 1999.

Course Code	Course Name	L	T	P	C
FRS106	BASIC BIOLOGY	3	0	1	4

Unit I: The Cell

History of cell, Cell theory, Cell Structure, Function and Organization of Prokaryotes & Eukaryotes. Unicellular and Multicellular organisms, Structure of DNA and RNA. Cell cycle-mitosis and meiosis.

Unit II: Genetics

Mendelian Principles, Mendel's Laws, Sex linked inheritance, sex determination and crossing over – Karyotyping analysis, Chromosomal mapping,

Unit III: Human Physiology - I

Integumentary System, Respiratory System, Cardiovascular System, Musculoskeletal System

Unit IV: Human Physiology – II

Digestive system. Nervous System, Endocrine System, Reproductive System, Excretory System

Unit V: Practical

1. Qualitative analysis of sugar, proteins, lipids and nucleic acids.
2. Study of Enzyme (Amylase), study of the effect of substrate concentration on Enzyme activity.
3. Estimation of protein by Lowry method.
4. Staining Techniques, Simple, Negative staining, Gram Staining.
5. Study of aseptic techniques-preparation of cotton plugs for test tubes and pipettes, wrapping of Petri- plates and pipettes, transfer of media and inoculums.
6. Staining of bacteria: a) Simple staining b) Gram's staining.

References:

1. Singh, B. D. (2009). Fundamentals of Genetics. Kalyani Publishers.
2. Prasad, B. K., and Singh, B. D. (2009). Objective Genetics. Kalyani Publishers.
3. Simmons, M. J., & Snustad, D. P. (2006). Principles of genetics. John Wiley & Sons.
4. Sequeira, M. G., Kapoor, K. K., Yadav, K. S. P., and Tauro., P. (2018). An Introduction to Microbiology. New Age International Publishers.
5. Strickberger, M. W. (2015). Genetics (3rd ed). Pearson Education India.
6. Sharma, P. D. (2010). Microbiology. Rastogi Publications.

THIRD SEMESTER

Course Code	Course Name	L	T	P	C
FRS201	FORENSIC DERMATOGLYPHICS	2	0	2	4

Unit I: Introduction to Fingerprints and its Patterns

Biological significance of skin pattern, Ridge formation, Composition of Sweat, Fingerprint patterns, Pattern Areas, General and Individual characteristics of fingerprints; Classification of fingerprints.

Unit II: Recording and Examination of Fingerprints

Ridge Counting and tracing, filing and searching. Taking fingerprints from living and dead persons.

Unit III: Latent Fingerprints

Latent fingerprint and Chance Fingerprints in criminal investigation, investigating latent fingerprints, various methods of development of fingerprints: physical and chemical methods, presentation of fingerprint evidence in court.

Unit IV: Fingerprint Practical

1. Making of fingerprints on fingerprint cards and identifying the pattern
2. Development of fingerprints using physical methods
3. Development of fingerprints using chemical methods
4. Classification of fingerprints
5. Lifting and identification of latent fingerprints

References:

1. Bridges, B. C., Vollmer, A., & Munir, M. (2000). Criminal Investigation, Practical Fingerprinting, Thumb Impressions, Hand Writing, Expert Testimony, Opinion Evidence. University Book Agency.
2. James, S. H., & Nordby, J. J. (2002). Forensic science: an introduction to scientific and investigative techniques. CRC press.
3. Nanda, B. B., and Tewari, R. K. (2001) Forensic Science in India. Select Publishers, New Delhi.
4. Hall, A. B., & Saferstein, R. (2020). Forensic Science Handbook, Volume I. CRC Press.
5. Sharma, B. R. (2001). Forensic Science in Criminal Investigation and Trials (3rdEdn) Universal Law Publishing Co. Ltd. New Delhi.
6. S. K. Chatterjee, S. K. (1981). Speculation in fingerprint identification. SK Chatterjee.

Course Code	Course Name	L	T	P	C
FRS202	BASIC PHYSICS	3	0	1	4

Unit I: Calculus

Basic ideas of Limits, continuity, differentiation. Plotting functions.

Differential equations of first order, separation of variables and homogeneous equations, Linear Differential equation, Bernoulli's equation, Second order differential equation, Partial derivatives, exact and inexact differentials.

Unit II: Vector Analysis

Properties of vectors, Scalar product and its invariance under rotations. Vector product, Scalar triple product and their interpretation in terms of area and volume respectively. Vector Operators. Gradient of a scalar field. Divergence and curl of a vector field.

Unit III: Mechanics, Elasticity & Fluid Dynamics

Motion, position and displacement, average velocity, average speed, acceleration, freely falling body, projectile motion, uniform circular motion, relative motion in one and two dimensions.

Newton's laws of motion, Interpretation and applications, Inertial and non-inertial frames and Pseudo forces. Centre of mass, Kepler laws. Elastic collision in Laboratory and C.M. system.

Energy, kinetic energy, work, work done by gravitational force, work done by spring force, power, work and potential energy, conservation of energy.

Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, Poisson's ratio. Pascal's law and its applications. Viscosity, Stokes' law, terminal velocity, streamline and turbulent flow, critical velocity, Surface energy and surface tension, angle of contact, capillary rise.

Unit IV: Sound Waves

Simple harmonic motion, energy of a Simple Harmonic Oscillation. Compound pendulum. Decay of free vibrations due to damping, types of damping.

Types of waves, transverse and longitudinal waves, wavelength and frequency, speed of travelling wave, the wave equation, sound waves, speed of sound, intensity and sound level, the Doppler effect, shock waves. Production of ultrasonic waves.

Unit V: Basic Physics Practical

1. Determination of rigidity modulus by dynamic method.
2. Determination of Young's Modulus by Flexure method.
3. Determination of coefficient of viscosity by Poiseuille's capillary flow method.

4. To determine the value of 'g' using Compound Pendulum.
5. Determination of frequency of a tuning fork by using a Sonometer.
6. Study the dependence of moment of inertia on distribution of mass.
using objects of various geometrical shapes but of same mass.
7. To set up CRO for Sine and Square wave and to find their frequency and amplitude.
8. To study Lissajous Figures by using electrical circuit.

References:

- Arfken, G. B., Weber, H. J., & Harris, F. E. (2013). *Mathematical Methods for Physicists* 7th edn (Waltham, MA).
- Dass, H. K. (2008). *Mathematical physics*. S. Chand Publishing.
- *Mathematical Methods for Physics and Engineering*, K. F. Riley, M. P. Hobson, S. J. Bence, Cambridge University Press.
- Riley, K. F., Hobson, M. P., & Bence, S. J. (1999). *Mathematical methods for physics and engineering*.
- Kleppner, D., and Kolenkow, R. J. (1973). *An introduction to mechanics*, 1973, McGraw-Hill.
- Crawford, F. S. (2011). *Waves: In SI Units (Vol. 3)*. Tata McGraw-Hill Education.
- Pipich, P V. *Physics of oscillations at the college of informatics*.

FOURTH SEMESTER

Course Code	Course Name	L	T	P	C
FRS205	QUESTIONED DOCUMENTS	2	0	2	4

Unit I: Questioned Document Types

Definition of documents questioned documents and the type of cases encountered; Importance, nature and problems of documents, Location, collection, handling and presentation of documents, adequacy of exemplars and standards.

Unit II: Methods of Detection

Detection and deciphering of indented writing, charred documents, invisible/secret writing; Ink Examination, Composition of major types of writing inks (carbon ink, fountain pen ink, ballpoint pen ink, rolling ball marker inks, fiber or porous tips pen ink.

Unit III: Examination of documents

Examination of alterations, erasures, overwriting, additions and obliterations. Instruments and equipment used for examination of fraudulent documents; Identification & comparison of typescripts.

Unit IV: Handwriting & Signature Identification

Principle of handwriting, individual and class handwriting characteristics. Signatures: Authentic signatures, forged signatures, disguised signatures, traced signatures and their characteristics. Factors affecting the signature of individuals.

Unit V: Questioned document practical

1. Examinations of alterations in documents.
2. Identification of Indented writing
3. Identification of Invisible writing
4. Identification of class and individual characteristics in handwriting.
5. Identification of security features in currency notes.
6. TLC of different ink samples

References:

1. James, S. H., & Nordby, J. J. (2002). Forensic science: an introduction to scientific and investigative techniques. CRC press. Saferstein, R. (2004). Criminalistics: An introduction to forensic science.
2. Saferstein, R. (2004). Criminalistics: An introduction to forensic science.
3. Sharma, B. R., (2001). Forensic Science in Criminal Investigation and Trials (3rd Ed) Universal Law Publishing Co. Ltd. New Delhi.
4. Koppenhaver, K. M. (2007). Forensic document examination: principles and practice.

Course Code	Course Name	L	T	P	C
FRS206	GENERAL BIOLOGY	3	0	1	4

Unit I: Genetics

Chromosomes: Discovery, morphology, and structural Organization. Special types of chromosomes; Salivary gland and Lamp brush chromosomes. Mutations and Mutagens: Definition and Types of mutations.

Unit II: Immunology

Immunity and Immune System, Structure and interaction of antigens and antibody, B cell / T cell development, diversity & recognition, Immunoglobulin structure & types, immune system disorders.

Unit III– Plant Morphology and Anatomy-I

Principles of Taxonomy and systems of classification of angiosperms (Bentham and Hooker) and Gymnosperms (Chamberlain), Mechanical and conducting tissue systems in plants

Unit IV– Plant Morphology and Anatomy-II

Morphology of root, leaf, stem, flowers and their modifications. Anatomy of mono and dicot roots leaves and stems, secondary growth, growth rings, calculation of life of wood.

Unit V: Biology Practical

1. Study of different stages of Cell Division i.e., mitosis and meiosis
2. To study the structure of cheek cells.
3. To study the structure of plant cells.
4. Study of morphology of red blood cells.
5. Studying the morphology of different plant parts.
6. Studying the modifications of different plant parts.

References:

1. Breeding, P., & Singh, B. D. (1985). Kalyani publishers. New delhi.
2. Prasad, B. K., Singh, G., Kumar, R., & Sharma, A. K. (2022). Induced mutations in barley (*Hordeum vulgare* L.). *The Pharma Innovation Journal*, 11(1), 577-584.
3. Simmons, M. J., & Snustad, D. P. (2006). Principles of genetics. John Wiley & Sons.
4. Sequeira, M. G., Kapoor, K. K., Yadav, K. S. P., and Tauro., P. (2018). An Introduction to Microbiology. New Age International Publishers.
5. Pelczar, M. Jr., ECS Chan, E. C. S. & Krieg, N. R. (2001). Microbiology (5th ed). McGraw Hill Education.
6. Strickberger, M. W. (2015) Genetics (3rd ed). Pearson Education India. 2015.
7. Sharma, P. D. (2010). Microbiology. Rastogi Publications.

COURSE CODE	COURSE NAME	L	T	P	C
FRS207	FORENSIC CHEMISTRY	3	1	0	4

Unit I: Forensic chemistry

Introduction to forensic chemistry, Types of cases/exhibits received for analysis, Overview of forensic chemical analysis. Bribe Trap Cases: Examination of Chemicals (Phenolphthalein) used in Bribe trap cases.

Unit II: Examination of volatile poisons and alcoholic beverages

Analysis of methanol, acetone, chloroform, phenol. Examination procedures involving standard methods and instrumental techniques, analysis of beverages: alcoholic and non-alcoholic, country made liquor, illicit liquor and medicinal preparations containing alcohol and drugs as constituents.

Unit III: Arson

Arson: chemistry of fire, investigation and evaluation of the clue material, analysis of arson exhibits by instrumental methods: management of arson cases. Examination of petroleum products: distillation and fractionation, standard methods of analysis of petroleum products for adulteration.

Unit IV: Explosives

Classification, composition, and characteristics of explosives, pyrotechnics, IEDs, explosion process and effects, types of hazards, the effect of blast wave on structures, post-blast residue collection, reconstruction of sequence of events, evaluation, and assessment of scene of explosion, systematic examination of explosives and explosion residues.

References:

- Burger, A. (1970). Medicinal Chemistry. Vol. II, Wiley Interscience, New York.
- Vogel, A. I. (1974). Practical organic chemistry. Long Man Group Ltd, London.
- Boudreau, J. E. et al. (1977). Arson & Arson Investigation, Surevey& Assessment National Institute of Law Enforcement, U.S Deppt of Justice, US Govt. Printing Press.
- Kirk, P. L., & DeHaan, J. D. (2002). Kirk's fire investigation. Prentice Hall.
- Kirk, P. L., & DeHaan, J. D. (2002). Kirk's fire investigation. Prentice Hall.
- Waltch, F. (1966). Principles and Methods of Chemical Analysis, 2nd Ed. Prentice Hall.
- Finar, I. L. (2003). Organic Chemistry Vol. II. Longmans. Essex.

FIFTH SEMESTER

COURSE CODE	COURSE NAME	L	T	P	C
FRS301	FORENSIC TOXICOLOGY	2	0	2	4

Unit I: Introduction to Toxicology and Toxins

Introduction to toxicology, classification of poisons, action of poisons and factors modifying its action, modes of administration of poisons, routes of elimination. Introduction to poisoning by drugs (barbiturates, amphetamine, LSD, cocaine, benzodiazepines, Insecticides (organochloride, organophosphorus, and carbamates)

Unit II: Isolation techniques of toxins

Isolation methods of chemical substances from viscera and other relevant materials- non-volatile organic poisons: - Stas-otto method, ammonium sulfate method, tungstate and acid digestion method, toxic cations (metals)- dry Ashing and wet digestion methods, toxic anions, dialysis methods, total alcoholic extract.

Unit III: Heavy metal poisoning and corrosive poisons

Introduction to heavy metal poisoning (Pb, As, Hg), sign and symptoms. Mineral acids (nitric acid, hydrochloric acid, sulphuric acid)

Unit IV: General study and analysis of vegetable and animal poison

Introduction to poisoning by vegetable poisons (*Abrus Precatorius*, *Calotropis Gigantia*, *Croton*, *Castor*, *Opium*, *Cannabis*, *Datura*, *Marking Nut*, *Nux Vomica*, *Oleander*, *Aconite*, *Ergot*, *Digitalis*).
Introduction to poisoning by snake venom.

Unit V: Practical

1. Analysis of metallic poisons.
2. Analysis of volatile and non-volatile poisons.
3. TLC of insecticides and pesticides.
4. TLC of Benzodiazepines.
5. Analysis of vegetable poisons

Text & References:

- Bray A. B., Roberts L. J., K & Watson, J. D., (1989). *Molecular Biology of Cell*, 2nd Ed Garland Pub., New York.
- Pandey, B. P., (1998). *Plant Anatomy*; S. Chand, New Delhi.
- Ball, S. (1991). *Environment Law – The Law and policy relating to protection of environment*, Universal Law Pub Co, Delhi.
- Culliford, B. J. (1978). *Biology Methods Manual*. London: Metropolitan Police Forensic Science Laboratory.
- Anderson, G. S., Byrd, J. H., & Castner, J. L. (2000). *Insect succession on carrion and its relationship to determining time of death*.
- Catts, E. P., & Haskell, N. H. (Eds.). (1990). *Entomology & death: a procedural guide*. Forensic Entomology Associates.
- Li, R. (2008). *Forensic biology: identification and DNA analysis of biological evidence*. CRC press.
- Simmons, M. J., & Snustad, D. P. (2006). *Principles of genetics*. John Wiley & Sons.

Course Code	Course Name	L	T	P	C
FRS302	FORENSIC PHYSICS	2	0	2	4

Unit 1: Forensic Physics

Definition, scope, significance of forensic physics.

Glass evidence – collection, packaging, analysis. Matching of glass samples by mechanical fit and refractive index measurements, Fracture analysis and direction of impact.

Paint evidence – collection, packaging and preservation. Analysis by destructive and non-destructive methods. Importance of paint evidence in hit and run cases.

Soil evidence – importance, location, collection and comparison of soil samples

Unit 2: Examination of tool marks

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 and fabrics, wires/cables, seals, counterfeit coins, physical match of broken objects.

Restoration of erased/obliterated marks in different surfaces.

Unit 3: Forensic Speaker Identification

Forensic Speaker Identification: Speaker Identification and Tape Authentication: Voice Production Theory, Speech Signal Processing and Pattern Recognition, Acoustic Parameters of Sound, Fourier Analysis, Frequency and Time Domain Representation of Speech Signal, Analogue to Digital Conversion-Sampling and Quantization, Fast Fourier Transform, Speech Enhancement, Authentication of Audio-Video Signal.

Unit 4: Practical

1. Density gradient analysis of soil samples.
2. Determination of density of glass by specific gravity bottle method
3. Comparison of broken glass bangles.
4. Physical matching of broken pieces of different objects.
5. Comparison of tool marks.

List of Books:

1. Siegel, J. A., & Saukko, P. J. (2012). Encyclopedia of forensic sciences. Academic Press.
2. Houck, M. M., & Siegel, J. A. (2009). Fundamentals of forensic science. Academic Press.
3. Fisher, B. A., Tilstone, W. J., & Woytowicz, C. (2009). Introduction to criminalistics: the foundation of forensic science. Academic Press.
4. Neustein, A., & Patil, H. A. (2012). Forensic speaker recognition (Vol. 1). New York, United States: Springer.
5. Maher, R. C. (2018). Principles of forensic audio analysis (Vol. 34). Springer International Publishing.

Course code	Course name	L	T	P	C
FRS303	DIGITAL AND CYBER FORENSICS	3	0	1	4

Unit I: Fundamental of computer and cyber law

Introduction to computer and its components, computer memory, windows and Unix file storage, operating system. Introduction to hardware and software, key terms, number systems, boot process, file types and signature.

cyber laws, concept of jurisdiction, cyber jurisdiction, overview of Indian legal system, introduction to it act 2000, amendments in it act.

Unit II: Basics of digital and cyber forensics

Introduction to digital forensics, branches of digital forensics, phases of digital forensics investigation, digital evidence, handling at crime scene as per standards, collection and preservation of digital evidence, processing and analysis, and reporting.

Definition and types of cybercrimes, reasons for commission of cybercrimes. Types of Cybercrimes – computer stalking, pornography, hacking, crimes related to intellectual property rights, computer terrorism, hate speech, private and national security in cyberspace. An overview of hacking, spamming, phishing, and stalking, computer virus.

Unit III: Malware analysis

Introduction to malware, types of malwares – virus, worm, trojan, backdoor, ransomware, the goals of malware analysis, malware analysis techniques, basic static techniques: hashing, finding strings, packed and obfuscated malware, portable executable file format, linked libraries and functions, pe file header and sections, virtual machines for malware analysis.

Unit IV: Digital analysis tools

portable devices and 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 courtroom testimony based upon the examination. Password recovery tools.

Unit V: Practical

1. Breaching security and operation of digital systems
2. Treatment of exhibits. Creating bit stream of the original media.

Text & References:

- Newman, R. C. (2007). Computer forensics: evidence collection and management. CRC Press.
- Casey, E. (Ed.). (2001). Handbook of computer crime investigation: forensic tools and technology. Elsevier.
- Clark, F., & Diliberto, K. (1996). Investigating computer crime. CRC Press.
- Tewari, R,K, Sastry, P.K., And Ravikumar, K.V. (2003): computer crime and computer forensics, select publisher, New Delhi.
- Lang, D. T. (2002). Introduction to Computer forensics. CRC.

Course Code	Course Name	L	T	P	C
FRS305	INTERNSHIP	0	0	0	4

The Internship for students of forensic science will consist of the attachment to a FSL, CFSL, Court, Mortuary, Pharmaceutical Laboratory or Testing Laboratory for four weeks. They would observe the expert on his job as to how the investigations, are done, analysis is made and interpreted. The student is also to learn how to write the report in addition to learning the methodologies of presenting the evidence in the court.

Examination Scheme:

Work done during the internship period	50 marks
Internship report	25 marks
Viva voce	25 marks
Total	100 marks

SIXTH SEMESTER

Course Code	Course Name	L	T	P	C
FRS306	FORENSIC BIOLOGY	2	0	2	4

Unit I: Hair

Importance, nature, location, collection, evaluation; Human & Animal Hair morphology and its biochemical properties, Phases of hair growth, types of hair. Differences between animal and human hair, Forensic examination of different types of hair

Unit II: Palynology

Study of spore, powdered minerals and pollens of forensic importance, Use of pollen grains & spores in criminal or civil investigation, Applications of Forensic Palynology.

Unit III: Blood

Common body fluids. Composition and functions of blood. Collection and preservation of blood evidence. Distinction between human and non-human blood. Determination of blood groups. Antigens and antibodies. Forensic characterization of bloodstains. Typing of dried stains.

Unit IV: Body fluid

Semen. Forensic significance of semen. Composition, functions and morphology of spermatozoa. Collection, evaluation and tests for identification of semen. Individualization on the basis of semen examination. Composition, functions and forensic significance of saliva, sweat and urine. Tests for their identifications.

Unit V: Practical

1. To determine blood group from blood samples.
2. To carry out the crystal test on a blood sample.
3. To identify blood samples by chemical tests.
4. To identify the given stain as saliva.
5. To identify the given stain as urine.
6. Microscopic examination of Hair.

References:

- Eckert, W. G., & James, S. H. (Eds.). (1998). Interpretation of bloodstain evidence at crime scenes. CRC press.
- Gunn, A. (2019). Essential forensic biology. John Wiley & Sons.
- Houck, M. M. (Ed.). (2015). Forensic biology. Academic Press.
- Hall, A. B., & Saferstein, R. (2020). Forensic Science Handbook, Volume I. CRC Press.
- Bevel, T. (2008). Ross M. Gardner bloodstain pattern analysis. Boca Raton.

COURSE CODE	COURSE NAME	L	T	P	C
FRS307	FORENSIC BALLISTICS	3	0	1	4

Unit I: Introduction to Ballistics

Definition, branches of ballistics, history and background of firearms, classification characteristics and firing mechanism of smooth bored firearms and rifled firearms, country-made firearms. Ammunition: classification and constructional features of different types of cartridges, types of primers and priming composition, propellants and their compositions, various types of bullets and compositional aspects, arms and explosives act,

Unit II: Internal and External ballistics

Internal ballistics: definition, General principles of internal ballistics - ignition of propellants, shape and size of propellants, manner of burning etc.

External ballistics: definition, vacuum trajectory, effect of air resistance on trajectory, base drag, yaw, shape of projectile and stability, coefficient of reduction and sectional density, recoil velocity, Ricochet and heat problem encountered.

Unit III: Terminal & Wound ballistics

Definition, interaction and penetration of various types of projectiles in various tissues, factor affecting wound ballistics, Various aspects of wound ballistics, nature of wounds of entry & exit, Evaluation of firearm injuries caused due to shot-gun, and rifle firearms handguns and country made firearms, post-mortem and anti-mortem firearm injuries.

Unit IV: Identification of firearms and ammunition

Principles and practice of identification of firearms, different types of marks produced during firing process on cartridge-firing pin marks, breech face marks, chamber marks, extractor and ejector marks, Different types of marks produced during firing process on bullet-number/direction of lands and grooves, striation marks on lands and grooves. GSR (Gun Shot Residue) and its analysis

Unit V: Practical

1. Study of ammunitions (Bullet and cartridge)
2. Chemical analysis of explosive materials
3. Study of various parts of the firearms: - barrel, action, stock, caliber, choke etc.

References:

- James, S. H., & Nordby, J. J. (2002). Forensic science: an introduction to scientific and investigative techniques. CRC press.
- Modi, A Text Book of Medical Jurisprudence & Toxicology.
- Biswas, G. (2009). Review of forensic medicine and toxicology. Indian Congress of Forensic Medicine & Toxicology.
- Karmakar, R. N. (2007). Forensic medicine and toxicology. Academic publishers.
- Heard, B. J. (2011). Handbook of firearms and ballistics: examining and interpreting forensic evidence (Vol. 1). John Wiley & Sons.
- Wallace, J. S. (2018). Chemical analysis of firearms, ammunition, and gunshot residue. Crc Press.

Course Code	Course Name	L	T	P	C
FRS308	FORENSIC ANTHROPOLOGY	2	0	2	4

Unit 1: Significance of Forensic Anthropology

Scope of forensic anthropology. Study of human skeleton. Nature, formation, and identification of human bones. Determination of age, sex, stature from skeletal material.

Unit 2: Personal Identification – Somatoscopy and Somatometry

Somatoscopy – observation of hair on head, forehead, eyes, root of nose, nasal bridge, nasal tip, chin, supra-orbital ridges, circumference of head. Scar marks and occupational marks.

Somatometry – measurements of head, face, nose, cheek, ear, hand and foot, body weight, height.

Indices - cephalic index, nasal index, cranial index, upper facial index.

Unit 3: Facial Reconstruction

Portrait Parle/ Bertillon system. Photofit/identity kit. Facial Reconstruction, Importance of tissue depth in facial reconstruction, Facial superimposition techniques: Craniofacial superimposition techniques – photographic super imposition, video superimposition, Roentgenographic superimposition. Genetic and congenital anomalies – causes, types, identification, and their forensic significance.

Unit 4: Practical

- 1 To determine of age from skull and teeth.
2. To determine of sex from skull.
3. To determine sex from pelvis.
4. To study identification and description of bones and their measurements.
5. To perform somatometric measurements on living subjects.
6. To carry out craniometric measurements of human skull.
8. To estimate stature from long bone length.

Reference

- İşcan, M. Y. (2001). Global forensic anthropology in the 21st century. Forensic science international, 117(1-2), 1-6.
- Tersigni-Tarrant, M. A., & Shirley, N. R. (Eds.). (2012). Forensic anthropology: an introduction. CRC Press.

- Ubelaker, D. H. (2006). Introduction to forensic anthropology. Forensic anthropology and medicine: complementary sciences from recovery to cause of death, 3-12.

Course Code	Course Name	L	T	P	C
FRS310	PROJECT	0	0	4	4

Through the project work, students are expected to prove their analytical ability and practical skills obtained in the area that they have specialized in. This course also would build the research acumen among students who are interested to pursue research as their career.

The students will be required to undertake a research project in the field of forensic sciences and in the area of interest to the student. This should be done in consultation with the faculty supervisor and agency supervisor under whom he/she is getting trained. The project report will be around 100 pages and contain chapters as follows:

Chapter I: Introduction

Chapter II: Review of Literature

Chapter III: Methodology

Chapter IV: Data Analysis and Results

Chapter V: Discussion of Results

Chapter VI: Summary and Conclusion

SEMESTER VII

COURSE CODE	COURSE NAME	L	T	P	C
FRS401	FORENSIC MEDICINE AND PATHOLOGY	4	0	0	4

**Unit
I:**

Medical Jurisprudence, Medico Legal Autopsy and Personal Identification

Introduction and legal procedure, definition of autopsy, objectives, requirements, precautions, external examination, internal examination, collection, and preservation of different viscera for analysis, Postmortem report, Personal Identification: parameters of personal identification- race, religion, sex, age, teeth, bones, and miscellaneous, identification in mass disasters

Unit II: Death

Definition, cause, manner and mechanism of death, determination of time since death, medico legal aspects of death investigation; asphyxial deaths: definition, violent asphyxial deaths- hanging, ligature strangulation, throttling, suffocation, drowning, death from starvation, cold and heat, anaphylactic deaths.

Unit III: Injuries

Mechanism of injury, types of injuries: abrasions, bruises, lacerations, incised wounds, stab wounds, firearm injuries, defence wounds, self-inflicted wounds, injury patterns, medico legal aspects of injuries, ante-mortem, and post-mortem injuries, aging of injury, artificial injury; Thermal Injuries- burns, dowry deaths, scalds, electricity, lightning, explosions

Unit IV: Sexual offences

Natural sexual offences-rape, incest, examination of the victim, examination of the accused. Unnatural sexual offences- sodomy, buccal coitus, tribadism, bestiality. Sexual perversions.

Unit V: Abortion and Infanticide

Abortion: definition, classification, examination of the woman, examination of the aborted material, developmental stages of a foetus. Infanticide: definition, still born and dead born child, Postmortem examinations, causes of death in the newborn.

Text & References:

- James, S. H., & Nordby, J. J. (2002). Forensic science: an introduction to scientific and investigative techniques. CRC press.
- Modi, A Text Book of Medical Jurisprudence & Toxicology.
- Biswas, G. (2009). Review of forensic medicine and toxicology. Indian Congress of Forensic Medicine & Toxicology.
- Karmakar, R. N. (2007). Forensic medicine and toxicology. Academic publishers.
- Modi, J. P. (2001). Textbook of medical jurisprudence and toxicology. Tripathi pub.
- Parikh, C. K. (2001). Textbook of medical jurisprudence and toxicology.
- Comas, j.a. (1960): a manual of physical anthropology, charles c. Thomas u.s.a. Whitaker, d.k. And macdonald, d.u. (1989): forensic dentistry, Wolfe medical publications Ltd.

Course code	Course name	L	T	P	C
FRS402	FORENSIC SEROLOGY & DNA FINGERPRINTING	2	0	2	4

Unit I: Blood

Blood and its composition, Haemoglobin and its variants, theories, and biochemical tests for identification of blood, determination of species of origin from blood. Blood group typing- 'ABO' typing from wet and dried stains (absorption-inhibition, mixed agglutination, and absorption elution) of blood, blood group specific ABH substances, determination of secretor/non-secretor status, other blood group antigens- 'Rh' subtype, MN, s antigen, etc.

Unit II: Other body fluids

Composition of semen and its forensic examination, determination of species of origin from seminal fluid. Composition of other body fluids like urine, sweat, saliva, vaginal secretions and faeces and their forensic examination.

Unit III: Basics of Forensic DNA Analysis

Chemical structure of DNA and RNA, procedure for collection and preservation of biological samples for DNA analysis, techniques for DNA isolation from body fluids, tissues & bones and quantification of DNA.

Unit IV: Basic Methodology in Forensic DNA Analysis

DNA separation techniques, introduction to Polymerase chain reaction and its application, introduction to mitochondrial DNA and its forensic significance, Y-STR analysis and its forensic significance, DNA databases.

Unit V: Practical

1. To prepare gel plates for electrophoresis.
2. Organic extraction of DNA from blood.
3. Extraction of DNA from other body fluids.
4. Quantification of DNA
5. PCR for DNA samples

References:

- Calladine, C. R., & Drew, H. (1997). *Understanding DNA: the molecule and how it works*. Academic press.
- Gunn, A. (2019). *Essential forensic biology*. John Wiley & Sons.
- Easteal, S., McLeod, N., & Reed, K. (1991). *DNA Profiling*. CRC Press.
- Gardner, E. J. (1983). *Human heredity*. John Wiley & Sons.
- Burns, G. W. (1976). *The science of genetics: An introduction to heredity*. (No Title).
- Epplen, J., & Lubjuhn, T. (Eds.). (2012). *DNA profiling and DNA fingerprinting*. Springer Science & Business Media.
- Li, R. (2008). *Forensic biology: identification and DNA analysis of biological evidence*. CRC press.

Course code	Course name	L	T	P	C
FRS403	FORENSIC DRUG CHEMISTRY	3	1	0	4

Unit I: Introduction to Forensic Drug Chemistry

Introduction, Classification, and characterization of NDPS drugs, Search & Seizure, sampling procedure, forwarding of sample to FSL, Sample preparation and extraction for analysis, Reporting of drug cases, Drug abuse, Drug addiction, and its problems.

Unit II: Classification of Drugs commonly encountered

Narcotics, Depressants, Stimulants, Hallucinogens, Designer drugs, Club drugs and Date rape drugs, their active principles, signs and symptoms of various drugs, their fatal dose and fatal period.

Unit III: Analysis of Drugs

Narcotic drugs, Depressants, Barbiturates, methaqualone, Benzodiazepines, Stimulants, Hallucinogens, Designer Drugs, Club drugs, date rape drugs, and precursors by Field test kits for drugs by using color tests, thin layer chromatography and Instrumental techniques (HPTLC, UV-Vis spectrophotometry, Gas Chromatography, HPLC, GC-Mass Spectrometry and LC-Mass Spectrometry, Raman Spectroscopy and FTIR).

Unit IV: Laws related to forensic interest

Common terminology and NDPS Act, Small quantity and commercial quantity and extent of punishment.

References:

- Khan, J. I., Kennedy, T. J., & Christian, D. R. (2012). Basic principles of forensic chemistry (pp. 191-206). New York: Humana Press.
- Saferstein, R. (1987). Criminalistics: An Introduction to Forensic Science, Prentice-Hall. Inc., Englewood Cliffs: NJ.
- Vogel, A. I., & Jeffery, G. H. (1989). Vogel's textbook of quantitative chemical analysis. (No Title).
- Kirk, P. L., & DeHaan, J. D. (2002). Kirk's fire investigation. Prentice Hall.
- Yinon, J., & Zitrin, S. (1996). Modern methods and applications in analysis of explosives. John Wiley & Sons.
- Watson, C. A. (1994). Official and standardized methods of analysis. (No Title).
- Goutam, M. P., & Goutam, S. (2006). Analysis of plant poisons. Selective & Scientific Books.
- Vogel, A. I. (1974). Practical organic chemistry. Long Man Group Ltd, London.

COURSE CODE	COURSE NAME	L	T	P	C
FRS404	RESEARCH METHODOLOGY & QUALITY MANAGEMNET	3	1	0	4

Unit I: Research & Research design

Meaning of research, objectives of research, motivation in research, types of research.

Research design: need for research design, features of a good design, different research designs.

Sampling: principles, methods, types of sampling

Procedures in research: identification of the problem, literature survey, reference collection, familiarity with ideas and concept of investigation, qualitative and quantitative analysis, results writing a research paper and thesis.

Unit II: Data collection and analysis

types of data, collection of data, double blind procedures, incidence and prevalence studies, data analysis: measures of central tendency, measures of dispersion, measures of asymmetry, correlation & regression analysis.

Unit III: Hypothesis and statistics

Hypothesis testing: problems and hypothesis, variables and type of variables, parametric and nonparametric statistics; level of significance, the various nonparametric tests with one sample, two samples and k-samples, chi square analysis, analysis of variance (ANOVA).

Unit IV: Quality Management

Management requirements- General requirements for the competence of testing and calibration laboratories, quality system, document control, internal audit, corrective and preventive actions.

Unit V: Technical requirements

Test and calibration methods, equipment, measurement traceability, sampling and handling of test and calibration items, assuring the quality of tests and calibration results, reporting of results, LIMS, validation, and safety equipment.

References:

- Kerlinger, F. N. (1983). Foundations of behavioral research, 2nd Indian reprint.
- Rajamanickam, M. (2001). Statistical methods in psychological and educational research. Concept publishing company.
- Smith, J. A. (2015). Qualitative psychology: A practical guide to research methods. Qualitative psychology, 1-312.
- Engen, T., Kling, J. W., & Riggs, L. A. (1971). Experimental psychology.

Course code	Course name	L	T	P	C
FRS405	EXPLOSIVE ANALYSIS AND POST-BLAST INVESTIGATION	3	1	0	4

Unit I: Introduction to Explosive and Explosion

Classification of explosives- primary, secondary explosive, Detonators, initiating devices Safety fuse, Pyro technique, IEDs and firing mechanism of IEDs.

Unit II: Mechanics of Explosion

The generation of shock wave and the effect of fragmentation, Types of explosions, Laws related to Explosive and Explosion.

Unit III: Processing of scene of crime of explosion

Role of forensic scientist in post-blast investigation, documentation of bomb scene, collection of post blast residue, evaluation and assessment of explosion site and reconstruction of sequence of events.

Unit IV: Analysis of explosives

Methods for extraction of explosive from post blast material/ debris, Qualitative analysis of explosives and explosion residue by colour test, TLC and instrumental techniques.

References:

- Gaskell, D. R. (2011). Forensic investigation of explosions. CRC Press.
- Explosive Substances Act, 1908 of India.
- Akhavan, J. (2022). The Chemistry of Explosives 4E. Royal Society of Chemistry.
- Yinon, J., & Zitrin, S. (1996). Modern methods and applications in analysis of explosives. John Wiley & Sons.
- Working Procedure Manual-Explosives, DFS, MHA, India.

SEMESTER VIII

Course code	Course name	L	T	P	C
FRS407	ADVANCE ANALYTICAL INSTRUMENTATION	3	0	1	4

Unit I: Spectroscopy methods

Fundamental principles and forensic applications of Ultraviolet-visible spectroscopy, infrared spectroscopy, atomic absorption spectroscopy, atomic emission spectroscopy and mass spectroscopy, Colorimetric analysis and Lambert-Beer law, Nuclear Magnetic Resonance spectroscopy: Basic principles, theory, and Instrumentation.

Unit II: X- ray spectrometry

Fluorescence, energy Dispersive X-ray analysis (EDX), wavelength Dispersive X-ray analysis (WDX), X-ray diffraction, Augur effect, XRF (X-ray fluorescence), Small Angle X-ray Scattering (SAXS), Fourier Transform spectrophotometry (FTIR).

Unit III: Analytical separation & Chromatographic Methods

Chromatographic methods. Fundamental principles and forensic applications of thin layer chromatography, gas chromatography, liquid chromatography, HPLC, HPTLC, Mass spectroscopy and liquid chromatography–mass spectrometry,

Unit IV: Microscopic techniques

Concept of Absorption, emission and scattering, Optical microscopy: Simple microscope, compound microscope & comparison microscope. Electron microscopy: Scanning Electron Microscope, Transmission electron microscope, Energy Dispersive X- ray Spectroscopy (EDAX).

Unit V: Practical

1. To determine the concentration of a colored compound by calorimetry analysis.
2. To carry out thin layer chromatography of ink samples.
3. To carry out separation of organic compounds by paper chromatography.
4. To identify drug samples using UV-Visible spectroscopy.

References:

- Patania, V. B. (2004). Spectroscopy, Campus Books International.
- Workman Jr, J., & Springsteen, A. (1998). Applied spectroscopy: a compact reference for practitioners. Academic Press.
- Subrahmanyam, N. (2012). A textbook of Optics. S. Chand Publishing.
- Chatwal, G. R. (2022). Instrumental methods of chemical analysis. Himalaya publishing house.
- Willard, H. H., Merritt Jr, L. L., Dean, J. A., & Settle Jr, F. A. (1988). Instrumental methods of analysis.
- Dean, J. A. (1995). Analytical Chemistry Handbook, Tata McGraw Hill Inc.
- Thompson, K. C., & Reynolds, R. J. (1978). Atomic absorption, fluorescence and flame emission spectroscopy: a practical approach. (No Title).
- Webster, F. X., & Kiemle, D. J. (2005). Spectrometric identification of organic compounds. John Wiley & Sons.

Course code	Course name	L	T	P	C
FRS408	ADVANCE FORENSIC TOXICOLOGY	3	1	0	4

Unit I: Introduction to Forensic Toxicology

Introduction to toxicology, scope and applications, types of toxicology. Poisons—definition, classification of poison and methods of administration of poison, mode of action of poison, medico-legal aspects in poisoning case.

Unit II: Collection, Preservation & isolation techniques

Collection and preservation of biological evidence (viscera and /or body fluids) and circumstantial evidence in fatal and survival cases. Submission of samples to the laboratory, Postmortem examination, specific analysis plan/approach to toxicological examinations of poisoning samples. Classification of matrices. Isolation and Extraction of poison/ drug by various classical and modern methods using instrumental techniques

Unit III: Extraction, Isolation & Identification of drugs

Systematic Extraction, Isolation, Identification, Estimation of following poisons from viscera, blood and urine

- (i) Common narcotics (like poisons): opium and its derivatives.
- (ii) Barbiturates, Benzodiazepines derivatives, Amphetamines.
- (iii) Insecticides/ Pesticides: Organochloro, organophosphorus and carbamates.
- (iv) Common inorganic poisons, salts of Arsenic, Mercury, Lead and Cyanides.

Unit IV: General Study of Plant and Animal Poison

Plant poisons: Nature, type, mode of action, extraction, isolation, Identification of the following:

- (i) Poisonous seeds: *Abrus precatorius*, *Atropa belladonna*, *Argemone mexicana*, *Cerbera thevetia*, *Croton tiglium*, *Datura fastuosa*, *Ricinus communis*.
- (ii) Poisonous fruits: *Semicarpus anacardium*, *Urginea scilla*.
- (iii) Poisonous roots: *Digitalis*, *Aconitum napellus*, *Plumbago rosea*.

Animal Poisons: Snake venom, composition, site of action, mode of action, effect on the body, and tests for identifications.

Unit V: Metabolism and excretion of poisons

Introduction, pathways of drug-metabolism-non synthetic pathway or phase- I reactions like oxidation, hydroxylation, n-and -o dealkylation and sulphoxide formation, synthetic pathways or phase ii reactions like conjugation, acetylation, methylation of drugs/poisons (alcohols, barbiturates, amphetamines, and opiates)

References:

- Ho, M. H. (Ed.). (1990). Analytical methods in forensic chemistry. Ellis Horwood Limited.
- Working Procedure Manua Chemistry/Toxicology/Explosives/Narcotics, DFS, MHA. New Delhi
- Kennedy, Thomas J., Christian, Jr., Donnell Basic Principles of Forensic Chemistry, Springer
- Khan, J. I., Kennedy, T. J., & Christian, D. R. (2012). Basic principles of forensic chemistry (pp. 191-206). New York: Humana Press.
- Saferstein, R. (1987). Criminalistics: An Introduction to Forensic Science, Prentice-Hall. Inc., Englewood Cliffs: NJ.
- Vogel, A. I., & Jeffery, G. H. (1989). Vogel's textbook of quantitative chemical analysis. (No Title).
- Smith, F. (2004). Handbook of forensic drug analysis. Elsevier.
- Robertson, J. (2008). Clarke's analytical forensic toxicology.
- Curry, A. S. (Ed.). (1985). Analytical methods in human toxicology. Weinheim: Verlag Chemie.
- Clarke, E. G. C. (Ed.). (1969). Isolation and identification of drugs (Vol. 1, pp. 255-234). London: Pharmaceutical press.
- Derelanko, M. J., & Hollinger, M. A. (2001). Handbook of toxicology. CRC press.

Course code	Course name	L	T	P	C
FRS409	FORENSIC ANTHROPOLOGY & ODONTOLOGY	3	1	0	4

Unit I: Forensic Anthropology

Definition, scopes and problems, human skeleton. Bones- identification, classification and determination of site, morphological and anatomical characteristics.

Unit II: Skeletal age, sex, and race

Skeletal age (earlier years): prenatal ossification. Postnatal appearance and union of centres ossification. Differences due to race. Skeleton age (later years): cranial suture closure, pubic symphysis. Sexing skeletal remains: general consideration and age factors. Sex differences in skull, pelvis, and long bones. 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.

Unit III: Personal identification techniques

Introduction and forensic importance; personal identification of living & dead- identification through Somatometry and somatoscopy observation, nails, occupation marks, scars, tattoo marks and deformities. Portrait parle/Bertillon system, facial reconstruction, super imposition technique.

Unit IV: Forensic odontology

Definition and Scope of Forensic Odontology, Types of dentitions, Basic structure of human teeth, types of teeth & their morphology, and determination of age from teeth using various methods, dental anomalies, and their role in Personal Identification.

Unit V: Bite marks

Types & forensic importance; collection and preservation of samples, analysis of bite marks, presentation of bite mark evidence in court of law; role of forensic odontology in mass disaster victim identification; dental charting; comparison of ante-mortem and post-mortem dental records.

References:

- Tersigni-Tarrant, M. A., & Shirley, N. R. (Eds.). (2012). Forensic anthropology: an introduction. CRC Press. Schmitt, A., Cunha, E., & Pinheiro, J. (2006). Forensic anthropology and medicine. Humana Press Incorporated.
- Ubelaker, D., & Scammell, H. (2000). Bones: a forensic detective's casebook. M. Evans.
- Beals, R.L., and Hoizir, H. (1985). An Introduction to Anthropology, Macmillan, New Delhi.
- Iscan, M. Y., & Steyn, M. (2013). The human skeleton in forensic medicine. Charles C Thomas Publisher.
- Senn, D. R., & Weems, R. A. (Eds.). (2013). Manual of forensic odontology. CRC press.

Course Code	Course Name	L	T	P	C
FRS412	PROJECT WORK	0	0	12	12

The students will be required to undertake a research project in the field of the forensic sciences and in the area of interest to the student. This should be done in consultation with the faculty supervisor and agency supervisor under whom he / she is getting trained. The project report will be around 100 pages and contain chapters as follows:

Chapter I: Introduction

Chapter II: Review of Literature

Chapter III: Methodology

Chapter IV: Data Analysis and Results

Chapter V: Discussion of Results

Chapter VI: Summary and Conclusion

The research should be original and should be action oriented in that the results should be able to throw light on some of the important unexplored areas that would be of practical use to the forensic experts. The following weightage is assigned at each stage of Student Project evaluation.

Activity	Weightage	Remarks
1 st Review (acceptance of project title)	5%	To be held after the completion of 3 rd semester TEEs
2 nd Review	40%	To be part of the continuous assessment during the IV semester
3 rd Review (Final)	50%	To be scheduled during the TEE period as Viva Voce examination
Submission of Project Report to the Department	5%	Two weeks before the viva-voce exam

MINOR COURSE

Course Code	Course Name	L	T	P	C
FRS104	INTRODUCTION TO FORENSIC SCIENCE	3	1	0	4

Unit I: Development and growth of Forensic Science

Introduction to Forensic science –Definition, nature, need and function; Principles of Forensic Science; Branches of Forensic Science, its utilization at the scene of crime and in the courts.

Unit II: Forensic Science Laboratory

Brief History & current scenario at National & International level, Role and Functions of DFSS, Services and functionalities provided by various FSLs, Structure of the FSLs, Various divisions in the FSL – General Analytical and Instrumentation, Ballistics, Biology, Chemistry Documents, Physics, Psychology, Serology, Toxicology, Cyber Forensic, Tape Authentication and Speaker Identification (TASI), DNA division. Mobile Forensic Science.

Unit III: Crime Scene

Defining a crime scene, Importance, location, and processing of crime scene. Types of Crime Scene: Indoor and outdoor, Primary, and secondary, and crime scenes based on size of evidence. \

Unit IV: Case Study

Aarushi Murder Case, Sheena Bora Murder Case, Ted Bundy serial murder case: role of forensic Investigation, Problem associated with investigation, Limitations of forensic expert and judgement.

References:

1. Horswell, J. (Ed.). (2004). The practice of crime scene investigation. CRC Press.
2. Fish, J. T., Miller, L. S., Braswell, M. C., Fenoff, R., & Wallace, E. W. (2022). Crime scene investigation. Routledge.
3. DeForest, P., Gaensslen, R., and Lee, H., Forensic Science; An Introduction to Criminalistics, McGraw Hill, New York, 1983.
4. Pepper, I. (2010). *Crime scene investigation: methods and procedures: methods and procedures*. McGraw-Hill Education (UK).
5. Maloney, M. S., Housman, D., & Gardner, R. M. (2014). Crime Scene Investigation Procedural Guide. CRC Press.

Course Code	Course Name	L	T	P	C
FRS108	CRIME SCENE INVESTIGATION	2	0	1	4

Unit I: Basics of Criminalistics

Definition of Criminalistics, Role of Criminalistics in Forensic investigation. Different types of evidence at the crime scene and their Forensic significance. Identification and Importance of Corpus Delicti, Modus operandi, Signature, trophy on the crime scene, admissibility of evidence.

Unit II: Crime Scene Management

Crime scene Management – initial response, role of first responding officer, Securing and Recording the Crime Scene. Protecting a scene of crime – various steps involved, contamination issues. Search Patterns of a crime scene, Crime scene Documentation, Collection, Packaging, Labeling & Forwarding of exhibits to Forensic Laboratories., Preservation of evidence, Health & Safety Protocols. Crime Scene reconstruction and its utility; chain of custody.

Unit III: Evidence

Definition, importance, and types of physical evidence. Crime Scene Evidence- Fingerprints and other prints, Blood, Semen & other biological fluids, Viscera, Shoe impressions, Tool marks, Tyre marks, Bite Marks, Hair – Animal & Human, Fibers & Fabrics, Glass, Soil, Pollens, Paint, Establishment of Identity of Individuals, Fingerprints/Footprints, Forensic Anthropology – Skeletal Remains, Forensic Odontology.

Unit IV: Lab

1. Investigation and sketching of indoor and outdoor scene of crime
2. Collection, packing and forwarding of different types of evidence.

References:

- Sharma, B. R., (2001). Forensic Science in Criminal Investigation and Trials (3rdEdn) Universal Law Publishing Co. Ltd. New Delhi.
- DeForest, P. R., Gaensslen, R. E., & Lee, H. C. (1983). Forensic Science: An Introduction to Criminalistics, McGrawHill. Inc., New York.
- James, S. H., & Nordby, J. J. (2002). Forensic science: an introduction to scientific and investigative techniques. CRC press.
- Eckert, W. G., & James, S. H. (Eds.). (1998). Interpretation of bloodstain evidence at crime scenes. CRC press.
- Hall, A. B., & Saferstein, R. (2020). Forensic Science Handbook, Volume I. CRC Press.

Course Code	Course Name	L	T	P	C
FRS204	FINGERPRINT EXAMINATION	3	0	1	4

Unit I: Introduction to Fingerprints and its Patterns

History and Principles of Fingerprints, Ridge formation, Composition of Sweat, Fingerprint patterns, General and Individual characteristics of fingerprints.

Unit II: Classification of Fingerprints

Various systems for FP classification; Henry classification system, numerical value, symbol, primary classification, secondary classification, sub-secondary classification, and final classification.

Unit III: Examination of fingerprints

Ridge Counting and tracing, Latent fingerprint, development of fingerprints: physical and chemical methods, fluorescent method, laser method, lifting of latent fingerprints. Photography of latent traces and presentation of fingerprint evidence in court.

Unit IV: Lab

1. Making of fingerprints on fingerprint cards
2. Identifying of the Fingerprint pattern
3. Development of fingerprints using physical methods

References:

- Bridges, B. C., Vollmar, A. Monir, M., Criminal Investigation, Practical Fingerprinting, Thumb Impression, Handwriting, Expert Testimony Opinion Evidence, The University Book Agency, Allahbad, 2000.
- Cowger, J. F. (2020). Friction ridge skin: comparison and identification of fingerprints. CRC Press.
- Mehta, M.K: Identification of Thumb Impression & Cross Examination of Fingerprints, N.M. Tripathi (P) Ltd, Bombay.
- Nath, S. (1991). Fingerprint Identification in crime detection. Reliance.

Course Code	Course Name	L	T	P	C
FRS208	QUESTIONED DOCUMENTS	3	0	1	4

Unit I: Introduction to Questioned Documents

Definition of documents questioned documents and the type of cases encountered; Importance, nature and problems of documents, Location, collection, handling and presentation of documents, adequacy of exemplars and standards.

Unit II: Handwriting & Signature Identification

Principles of handwriting & signature identification, Forgeries & its types and their detections, Factors affecting the signature of individuals.

Unit III: Forged Documents

Examination of alterations, erasers, overwriting, addition, and obliterations; Decipherment of secret, indented and charred documents.

Unit IV: Lab

- Examination and detection of fraudulent documents
- Identification of Invisible writing
- Identification of Indented writing

References:

- O'Hara and Osterburg. (1964). Introduction to Criminalistics, 1949, The MacMillan Co.,
- Koppenhaver, K. M. (2007). Forensic document examination: principles and practice.
- Bates, B. P. (1970). Identification Systems for Questioned Documents. Springfield, Illinois: Charles C Thomas Publishers.
- Bisesi, M. S. (2006). Scientific examination of questioned documents. CRC press.
- Hilton, O. (1992). Scientific examination of questioned documents. CRC press.
- Ellen, D., Day, S., & Davies, C. (2018). Scientific examination of documents: methods and techniques. CRC Press.

Course Code	Course Name	L	T	P	C
FRS304	INTRODUCTION TO CRIME AND CRIMINOLOGY	3	0	1	4

Unit I: Introduction to Criminology

Definition & scope of crime and Criminology, elements of Crime, theories of Criminology.

Unit II: Crime Typologies

Economic offenses, Organized crime, White collar crime, Occupational crime, Political crime, Habitual criminals, serial crimes, and psychotic criminals.

Unit III: Crime against Women

Harassment & humiliation of women, female victims, motivation of crime against women, self-image, self- esteem, and adjustment of the victims, creating awareness in the society.

Unit IV: Lab

- Crime data Analysis of last 5 years.
- Case Study on various types of crime.
- Qualitative & Quantitative analysis of types of crime.

References:

- Bacon, M. K., Child, I. L., & Barry III, H. (1963). A cross-cultural study of correlates of crime. *The Journal of Abnormal and Social Psychology*, 66(4), 291.
- Bajpai, G.S., *Development without Disorders*, Vishwavidyalaya Prakashan, Sagar (M. P.), 2002.
- Sarkar, S. (2004). *Development without disorders: Criminological viewpoints*.
- Ellis, L., & Walsh, A. (2000). *Criminology: A global perspective*. Allyn and Bacon.
- Ram Ahuja, A. (2000). *Criminology*; Rewal Pub. Jaipur.

Course Code	Course Name	L	T	P	C
FRS309	FORENSIC BOTANY AND PALYNOLOGY	3	0	1	4

Unit I: Forensic Botany

Different botanical evidence of forensic significance: Leaves, seeds, etc. Various types of wood, timber varieties, seeds, and leaves– their identification and matching.

Unit II: Diatoms

Types and morphology, methods of isolation from different tissue and forensic importance of diatom, forensic significance in drowning cases.

Unit III: Palynology

Study of spore, powdered minerals and pollens of forensic importance, Use of pollen grains & spores in criminal or civil investigation, Applications of Forensic Palynology.

Unit IV: Lab

- Identification of Diatoms
- Identification and matching of various types of botanical evidence.
- Study of pollen grains of forensic significance.

References:

- Budowle, B., Wilson, M. R., Burans, J. P., Breeze, R. G., & Chakraborty, R. (2005). Microbial forensics. In Microbial forensics (pp. 1-25). Academic Press.
- Carter, D. O., Tomberlin, J. K., Benbow, M. E., & Metcalf, J. L. (Eds.). (2017). Forensic microbiology. John Wiley & Sons.
- Hall, D. W., & Byrd, J. (2012). Forensic botany: a practical guide. John Wiley & Sons.
- Coyle, H. M. (Ed.). (2004). Forensic botany: principles and applications to criminal casework. crc press.

Course Code	Course Name	L	T	P	C
FRS406	FORENSIC MEDICINE AND PATHOLOGY	3	0	1	4

Unit I: Personal Identification

Personal Identification: parameters of personal identification- race, religion, sex, age, teeth.

Unit II: Death and its cause

Death and its causes, Signs of death, Postmortem changes, Determination of cause of death, manner of death, Estimation of time since death.

Asphyxial Deaths: Definition, violent asphyxial deaths- hanging, ligature strangulation, throttling, suffocation

Unit III: Injuries

Mechanism of injury: abrasions, bruises, lacerations, incised wounds, stab wounds, firearm injuries, medico legal aspects of injuries, ante-mortem, and post-mortem injuries, aging of injury

Thermal Injuries-Burns, dowry deaths, scalds, electricity, lightning, explosions

Unit IV: Lab

- Personal identification.
- Identification of injuries.
- Determination of time science death.
- Medicolegal Report Writing.

References

- James, S. H., & Nordby, J. J. (2002). Forensic science: an introduction to scientific and investigative techniques. CRC press.
- Modi, A Text Book of Medical Jurisprudence & Toxicology.
- Biswas, G. (2009). Review of forensic medicine and toxicology. Indian Congress of Forensic Medicine & Toxicology.
- Karmakar, R. N. (2007). Forensic medicine and toxicology. Academic publishers.

Course Code	Course Name	L	T	P	C
FRS410	FORENSIC PSYCHOLOGY	3	1	0	4

Unit I: Polygraphy

Polygraph/Lie Detector Test: History, Objectives, theoretical basis, parameters measured, stages of examination (Pre-test, In- test, post-test), Questioning techniques, Stim test, Limitations, Admissibility in the court of law, NHRC guidelines, case studies, etc.

Unit II: Narco-analysis

Principle, History, drugs used, procedure, reliability, admissibility, limitations, Indian scenario, case studies, etc.

Unit III: Brain Fingerprinting/Brain-Mapping

Principle, Importance, History, process, brain waves (P300, delta, theta, gamma, alpha), reliability, case studies, admissibility, etc.

Unit IV: Lab

- To cite a crime case where legal procedures pertaining to psychic behavior had to be invoked.
- To cite a criminal case in which narco analysis was used as a means to detect deception.
- To study a criminal case in which Brain Mapping was used to detect deception.

Referencess

- Moenssens, A. A., DesPortes, B. L., & Edwards, C. N. (2007). Scientific evidence in civil and criminal cases (pp. 111-191). New York, NY: Foundation Press.
- Hall, A. B., & Saferstein, R. (2020). Forensic Science Handbook, Volume I. CRC Press.
- Coetzee, T. (2008). The evidential value of crime scene investigation in child rape cases (Doctoral dissertation).
- Niehaus, J. (1998). Investigative forensic hypnosis. CRC Press.
- Siegel, J. A., & Saukko, P. J. (2012). Encyclopedia of forensic sciences. Academic Press.

Course Code	Course Name	L	T	P	C
FRS411	FORENSIC ENTOMOLOGY AND WILDLIFE FORENSICS	3	1	0	4

Unit I: Entomology

Basic Principle of Insect Biology, Life Cycle, Estimation of Time of Death, Preservation of Sample.

Unit II: Wildlife Forensics-I

Introduction and Importance of wildlife, Protected and endangered species of Animals and Plants, Wildlife species– Identification and examination of physical evidence by conventional and modern methods. Wildlife / Environment Protection Act.

Unit III: Wildlife Forensics-II

Identification of Pugmarks of various animals, Identification of Bear Bile, Elephant's Ivory, and Rhino horn.

Unit IV: Lab

- To prepare a case report on forensic entomology
- To prepare a case report on problems of wildlife forensics.
- Identification of Pug marks of various animals.

References

- Cooper, J. E., & Cooper, M. E. (2013). Wildlife forensic investigation: principles and practice. CRC press.
- Huffman, J. E., & Wallace, J. R. (2012). Wildlife forensics: methods and applications. John Wiley & Sons.
- Castner, J. L. (2009). General entomology and insect biology. In Forensic entomology (pp. 17-38). CRC press.
- Tomberlin, J. K., & Benbow, M. E. (Eds.). (2015). Forensic entomology: international dimensions and frontiers. CRC press.

SKILL ENHANCEMENT COURSE

Course Code	Course Name	L	T	P	C
SEC101	FORENSIC PHOTOGRAPHY	1	0	1	2

Unit I: Basics of photography

Basic principles and techniques of Black & White and colour photography, cameras and lenses, exposing, developments and printing, Different kinds of developers and fixtures, modern developments in photography, linkage of cameras and film negatives.

Unit II: Photography in Crime Scene Investigation

Applications of photography in forensic science, 3D photography, Photographic evidence, Infrared, thermal and ultraviolet photography, Digital photography digital water marking and digital imaging, videography/high speed videography, Crime scene and laboratory photography.

Unit III: Lab

1. To study various parts of Camera.
2. Crime Scene Photography (Indoor & Outdoor).
3. To review Case where photography played significant role in investigation.

References:

- Mancini, K., & Sidoriak, J. (2017). Fundamentals of forensic photography: practical techniques for evidence documentation on location and in the laboratory. Taylor & Francis.
- Marsh, N. (2014). Forensic photography: A Practitioner's guide. John Wiley & Sons.
- Murgod, S., Karnam, S., Gouse, S., & Girish, H. C. (2018). Forensic photography: Prospect through the lens. Journal of forensic dental sciences, 02-04.
- Ozkalipci, O., & Volpellier, M. (2010). Photographic documentation, a practical guide for non professional forensic photography. Torture, 20(1), 45-52.
- Redsicker, D. R., Gordner, G., James, S. H., & Laws, A. C. (2001). The practical methodology of forensic photography (Vol. 183). Boca Raton, FL: CRC Press.

Course Code	Course Name	L	T	P	C
SEC102	WILDLIFE FORENSICS	1	0	1	2

Unit I: Wildlife Forensics-I

Introduction and Importance of wildlife, Protected and endangered species of Animals and Plants, Wildlife species– Identification and examination of physical evidence by conventional and modern methods. Wildlife / Environment Protection Act.

Unit II: Wildlife Forensics-II

Identification of Pugmarks of various animals, Identification of Bear Bile, Elephant's Ivory and Rhino horn.

Unit III: Lab

1. To prepare a case report on problems of wildlife forensics.
2. Identification of Pug marks of various animals.

References:

- Alacs, E. A., Georges, A., FitzSimmons, N. N., & Robertson, J. (2010). DNA detective: a review of molecular approaches to wildlife forensics. *Forensic science, medicine, and pathology*, 6, 180-194.
- Cooper, J. E., & Cooper, M. E. (2013). *Wildlife forensic investigation: principles and practice*. CRC press.
- Huffman, J. E., & Wallace, J. R. (2012). *Wildlife forensics: methods and applications*. John Wiley & Sons.
- Linacre, A. (Ed.). (2009). *Forensic science in wildlife investigations*. CRC press.
- Gunn, A. (2019). *Essential forensic biology*. John Wiley & Sons.
- Freckelton, I. (Ed.). (2021). *Forensic Analysis: Scientific and Medical Techniques and Evidence Under the Microscope*. BoD–Books on Demand.

Course Code	Course Name	L	T	P	C
SEC103	INTRODUCTION TO BIOMETRY	1	0	1	2

Unit I: Basics of biometry

Definition, characteristics & operational biometry system, classification of biometric system, Biometric process- enrolment, identification & verification.

Measures used in biometric system- FAR, FRR, GAR, FTA, FTE & ATV

Unit II: Physiological & Behavioural biometric

Fingerprint, palm print, geometry of face, handwriting & signature recognition, gait pattern.

Unit III: Lab

1. Fingerprint characteristics for biometric identification.
2. Geometry of face for biometric identification.

References:

1. Jolicoeur, P. (2012). Introduction to biometry. Springer Science & Business Media.
2. Tistarelli, M. and C. Champod (2017). Handbook of biometrics for forensic science, Springer.
3. Tistarelli, M., & Champod, C. (Eds.). (2017). Handbook of biometrics for forensic science. Springer International Publishing.
4. Tistarelli, M. and C. Champod (2017). Handbook of biometrics for forensic science, Springer.
5. Mallett, X., et al. (2014). Advances in forensic human identification, CRC Press.
6. Ho, A. T. and S. Li (2015). Handbook of digital forensics of multimedia data and devices, John Wiley & Sons.
7. Jain, A. K. and S. Z. Li (2011). Handbook of face recognition, Springer.

Course Code	Course Name	L	T	P	C
SEC104	HANDWRITING IDENTIFICATION AND RECOGNITION	1	0	1	2

Unit I: Handwriting Identification

Basis of Handwriting identification, Characteristics of handwriting, factors influencing handwriting, basis of handwriting comparison, collection of handwriting samples, Forgery detection, tools used in handwriting examination.

Unit II: Handwriting Recognition

Basis of handwriting recognition, offline and on-line handwriting recognition, steps involved in handwriting recognition-pre-processing, feature extraction and classification, application of handwriting recognition.

Unit III: Lab

1. Examination and detection of fraudulent documents
2. Identification of class and individual characteristics in handwriting.

References:

1. Huber, R. A., & Headrick, A. M. (1999). Handwriting identification: facts and fundamentals. CRC press.
2. Harralson, H. H., & Miller, L. S. (2017). Huber and Headrick's Handwriting Identification: Facts and Fundamentals. Crc Press.
3. Pandey, R. K., Sankhla, M. S., & Kumar, R. (2018). Forensic Investigation of Suspected Document for Alteration, Erasures & Obliteration. Galore International Journal of Applied Science and Humanities, 2(1).
4. Allen, M. J. (2015). Foundations of forensic document analysis: theory and practice. John Wiley & Sons.
5. Sellers, C. (1959). Albert Sherman Osborn: Questioned Document Pioneer. ABAJ, 45, 1285.
6. Sellers, C. (1959). Albert Sherman Osborn: Questioned Document Pioneer. ABAJ, 45, 1285.
7. Tappert, C. C., & Cha, S. H. (2007). English language handwriting recognition interfaces. Text entry systems: Mobility, accessibility, universality, 123-137.

Course Code	Course Name	L	T	P	C
SEC105	ACCIDENTAL INVESTIGATION	1	0	1	2

Unit I: Automobile accidents

Introduction, sources of information, eyewitnesses, Surface Markings during RTA Cruses: Tire, skid marks, scuff marks etc, Pedestrian impacts and vehicle speed, vehicle condition, vehicle speed and damage, curved scuff marks, Time and distance, reaction time, Photography, and plans.

Unit II: Rail Accidents

Investigation of rail crash, criminal and safety investigation, Investigation principles, rail company tests, inspection of driving cab, examination of electrical/electronic/technological system and their failure. Necessary equipment's required for forensic examination.

Unit III: Lab

1. To identify the individuality of Tyre marks.
2. To estimate speed of vehicle from Skid mark.

References:

1. Ferry, T. S. (1988). Modern accident investigation and analysis. John Wiley & Sons.
2. LoweD. (1989). The Tachograph, 2nd Edition, Kogan Page, London.
3. Bohan, T. L., & Damask, A. C. (1995). Forensic Accident Investigation, Motor Vehicles. Michie Butterworth.
4. Batterman, S. C., & Batterman, S. D. (2016). Engineering as a Forensic Science. Forensic Science: A Multidisciplinary Approach, 383-399.
5. Kaminetzky, D. (2001). Design and construction failures: Lessons from forensic investigations. Galgotia Publications.

MULTIDISCIPLINARY COURSES

Course Code	Course Name	L	T	P	C
FRS103	FORENSIC & CORRECTIONAL PSYCHOLOGY	2	1	0	3

Unit I: Basics of Forensic Psychology

Definition and fundamental concepts of forensic psychology and forensic psychiatry. Psychology and law. Ethical issues in forensic psychology. Assessment of mental competency. Mental disorders and forensic psychology.

Unit II: Psychology and Criminal Behavior

Biological factors and crime – social learning theories, psycho-social factors, abuse. Juvenile delinquency – theories of offending (social cognition, moral reasoning), Child abuse (physical, sexual, emotional), juvenile sex offenders, legal controversies.

Unit III: Detection of Deception

Tools for detection of deception – interviews, non-verbal detection, statement analysis, voice stress analyzer, hypnosis. Polygraphy – operational and question formulation techniques, ethical and legal aspects, the guilty knowledge test. Narco analysis and brain electrical oscillation signatures – principle and theory, ethical and legal issues.

References:

1. Moenssens, A. A., DesPortes, B. L., & Edwards, C. N. (2007). Scientific evidence in civil and criminal cases (pp. 111-191). New York, NY: Foundation Press.
2. Hall, A. B., & Saferstein, R. (2020). Forensic Science Handbook, Volume I. CRC Press.
3. DeLadurantey, J. C., & Sullivan, D. R. (1980). Criminal investigation standards (pp. 116-21). New York: Harper & Row.
4. Niehaus, J. (1998). Investigative forensic hypnosis. CRC Press.
5. Siegel, J. A., & Saukko, P. J. (2012). Encyclopedia of forensic sciences. Academic Press.

Course Code	Course Name	L	T	P	C
FRS107	CRIMINAL JUSTICE SYSTEM AND LAW	2	1	0	3

Unit I: Criminal justice system

Introduction, Wings of criminal justice system- Police, prosecution & judicial officers. Role of Forensic scientists and medico-legal doctors in criminal investigation. Important Provisions of Code of Criminal Procedure- FIR, Complaint, Sec. 291, 292, 293, Cr PC 174. Framing of Charges, Bailable and Non-Bailable offence, cognizable and non-cognizable offence, summons, warrant, Investigation, inquiry, and trial.

Unit II: Introduction to IPC and IEA and their laws

Indian Penal Code, 1860- Definitions, General Exceptions, Relevant provisions. IPC 302, 304, 306, 307, 309, 375, 376, 377, 498.

Indian Evidence Act, 1872- Section 32, 45, 46, 47, 57, 58, 60, 65, 65B, 73, 135, 136, 137, 159.

Unit III: Sexual offences and Law

Sexual Offences - Rape, Recent Amendments in Rape Laws, Examination of the victims of rape & the accused, Collection of evidence in cases of sexual assault. Medical Termination of Pregnancy Act 1971.

References:

1. Lee, Henry C., Timothy Palmbach, and Marilyn T. Miller. Henry Lee's crime scene handbook. Academic Press, 2001.
2. Aggrawal, A. (2014). APC Textbook of Forensic Medicine and Toxicology-Avichal Publishing Company. Avichal publishing company.
3. Crime Scene Processing and Laboratory Workbook by Patric Jones
4. James, S. H., & Nordby, J. J. (2002). Forensic science: an introduction to scientific and investigative techniques. CRC press.
5. Saferstein, R. (2015). Criminalistics: An introduction to forensic science. Pearson Higher Ed.
6. Turvey, B. E. (2011). Criminal profiling: An introduction to behavioral evidence analysis. Academic press.
7. Sharma, D. B. (2005). Forensic science in criminal investigation & trials. Universal Law Publishing Company.

Course Code	Course Name	L	T	P	C
FRS203	CRIMINALISTICS	2	1	0	3

Unit I: Footprints and Shoeprint

Casting, Lifting, Evaluation, Analysis and comparison with reference/control sample(s), Gait Pattern Analysis, Forensic Significance Footwear Impressions: Casting, Lifting, Evaluation, Analysis and comparison with reference/control sample(s), Forensic Significance.

Unit II: Erased Marks & Serial Number Restoration:

Method of making- cast, punch, engrave; methods of obliteration, method of restoration- etching (different chemicals for different surfaces), magnetic, electrolytic etc., restoration of marks on wood, leather, polymer etc. recording of restored marks.

Unit III: Lip Prints and Ear Prints

Nature, Location, Types, Classification, Development, Lifting, Evaluation, Analysis, Minutiae Identification and comparison with reference/control sample(s), Forensic Significance.

Ear Prints: Nature, Location, Types, Classification, Development, Lifting, Evaluation, Analysis and comparison with reference/control sample(s), Forensic Significance.

References:

1. Siegel, J. A., & Saukko, P. J. (2012). Encyclopedia of forensic sciences. Academic Press.
2. Houck, M. M., & Siegel, J. A. (2009). Fundamentals of forensic science. Academic Press.
3. Zhang, D. D. (Ed.). (2002). Biometric solutions: For authentication in an e-world (Vol. 697). Springer Science & Business Media.
4. Inman, K., & Rudin, N. (2000). Principles and practice of criminalistics: the profession of forensic science. CRC Press.
5. Libal, A. (2014). Fingerprints, bite marks, ear prints. Simon and Schuster.