RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

M.Sc. Forensic Science (As per NEP-2020)

Two Year (Four Semester Degree Course)

<u>Semester I & II</u>
Teaching and Examination Scheme
& Syllabus

Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur

(Two Year) M.Sc. Forensic Science (As per NEP-2020)

Academic Session 2023-24 Onwards

Scheme of Teaching & Examination & Syllabus

M.Sc. Forensic Science Sem-I

S N	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
				Th	TU	P		Theory				Practical		
								Exam Hrs.	SEE	CIE	Mi n.	SEE	CIE	Min.
1	DSC	Advanced Forensic Science	MFS1T01	2	-	2	3	3	80	20	40	25	25	25
2	DSC	Forensic Chemistry and Toxicology	MFS1T02	2	-	2	3	3	80	20	40	25	25	25
3	DSC	Forensic Biology and Serology	MFS1T03	2	-	2	3	3	80	20	40	25	25	25
4	DSC	Digital and Cyber Forensics	MFS1T04	2	-	2	3	3	80	20	40	25	25	25
5	DSC	Criminalistics	MFS1T05	2	-	-	2	3	80	20	40	-	-	-
6	DSE	Forensic Physics and Ballistics /	MFS1T06A /	2	-	4	4	3	80	20	40	50	50	50
		Forensic Psychology	MFS1T06B											
7	RM	Research Methodology	MFS1RM	2	-	4	4	3	80	20	40	50	50	50
	Total			14	-	16	22		560	140		200	200	

M.Sc. Forensic Science Sem-II

S N	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
				Th	TU	P		Theory				Practical		
								Exam Hrs.	SEE	CIE	Mi n.	SEE	CIE	Min.
1	DSC	Advanced Forensic Science	MFS2T01	2	-	2	3	3	80	20	40	25	25	25
2	DSC	Forensic Chemistry and Toxicology	MFS2T02	2	-	2	3	3	80	20	40	25	25	25
3	DSC	Forensic Biology and Serology	MFS2T03	2	-	2	3	3	80	20	40	25	25	25
4	DSC	Digital and Cyber Forensics	MFS2T04	2	-	2	3	3	80	20	40	25	25	25
5	DSC	Criminalistics	MFS2T05	2	-	-	2	3	80	20	40	-	-	-
6	DSE	Forensic Physics and Ballistics /	MFS2T06A /	2	-	4	4	3	80	20	40	50	50	50
		Forensic Psychology	MFS2T06B											
7	OJT	OJT/FP	MFS2OJT	-	-	8	4	-	-	-	-	50	50	50
	Total			12	-	20	22		480	120		200	200	

Abbreviations:

DSC: Discipline Specific Core, DSE: Discipline Specific Elective, RM: Research Methodology, Th: Theory, P: Practical, OJT: On-the-Job Training (Internship/Apprenticeship), FP: Field Project, SEE: Semester End Examination, CIE: Continuous Internal Evaluation, RP: Research Project

DSC I: Paper MFS1T01- Advanced Forensic Science

Marks: 100   **Lectures: 2 Hrs/Week (30 Hrs/Sem)**

Course Outcomes: By the end of this Course, the learners will be able to:

1. Identify and describe the methods and techniques used in personal identification and autopsy procedures, including virtual autopsy and examination of personal artifacts.
2. Apply the principles and classification systems of fingerprint examination, including Henry's Classification and minutiae identification, for the purpose of identification and matching.
3. Understand the basics of forensic auditing and forensic accounting, including the definition and elements of fraud, and develop skills necessary for investigating and detecting different types of fraud.
4. Analyze and evaluate fraud investigation techniques, such as those used in bank insurance fraud, securities fraud, money laundering, and property dispute fraud, through the examination of famous case studies.
5. Demonstrate proficiency in forensic auditing and accounting practices by applying forensic audit fundamentals and conducting fraud investigations, including the evaluation of frauds and fraud deterrence strategies.
6. Critically assess and evaluate the role of forensic experts and fingerprint experts in the legal system, including their qualifications, presentation of evidence, and the jurisprudence surrounding fingerprint evidence.

Unit I: Forensic Identification of an Individual

Identity of a person, Methods of personal identification, Post mortem examination, Type of autopsy, objectives and procedure, Virtual autopsy, examination of personal artefacts, examination of tattoos. portrait parley. Exhumation: Forensic perspective and related aspects of exhumation, reasons of exhumation, techniques for detection of buried bodies underground (in mass graves/war crimes).

Unit II: Fingerprint Examination

Classification of Fingerprints: Henry's Classification, Single Digit Classification, Extended Henry's System. Recent techniques -Digital Imaging & Enhancement, Laser & other radiation-based techniques, Preservation and photography of fingerprints on various surfaces. Intricacies of Fingerprint Patterns, Minutiae Identification & Matching. Levels of Fingerprint examination. Post-mortem fingerprinting Presentation of fingerprint evidence, Fingerprint jurisprudence.

Unit III: Forensic Auditing & Forensic Accounting

Basics of Forensic Auditing and Forensic Accounting, Definition of Fraud under Companies Act 2013, Elements of Fraud, Corporate Fraud, Insurance fraud, skills of a Forensic expert dealing fraud investigation. Type of insurance fraud (cheque fraud, insurance claim fraud, bank transaction fraud, fraud in documents, etc.) Fundamentals of Forensic Audit.

Unit IV: Forensic Fraud Investigation

Steps of fraud investigation, Investigation of bank insurance fraud, securities fraud, hidden income or assets, insurance fraud and bankruptcy fraud, evaluating frauds, fraud deterrence, Property dispute fraud. Money laundering, types of money laundering. Review on famous case studies on corporate fraud, bank frauds, insurance claim fraud.

Note: Candidate should complete minimum 80% of the total no. of practical.

1. To develop and examination the fingerprints on various challenging surfaces.
2. To study level one, two, three details of fingerprints.
3. To develop latent fingerprints using physical methods.
4. To develop latent fingerprints using chemical methods.
5. To perform forensic examination of forged documents.
6. To perform forensic examination of alterations in cheque.
7. To review two case studies involving corporate frauds.
8. To reconstruct a given Crime scene (hit and run/burglary/murder, etc.)
9. To study the various methods of Autopsy examination.
10. To draw a sketch of a crime scene using baseline method/triangulation method.

Marks: 100   Lectures: 2 Hrs/Week (30 Hrs/Sem)

Course Outcomes: By the end of this Course, the learners will be able to:

1. Define forensic toxicology and demonstrate knowledge of the classification of poisons, their dosage, administration, and factors that modify their action. Understand the collection, preservation, and examination of toxicological exhibits in fatal and survival cases, including the signs, symptoms, and mode of action of poisoning.
2. Apply different methods of analysis in forensic toxicology, including preliminary screening, presumptive tests, inorganic analysis, micro-chemical methods, and examination procedures involving standard methods and instrumental techniques.
3. Identify and describe various pharmaceutical drugs, including antidepressants, antipsychotics, antibiotics, tranquillizers, and anti-seizure drugs. Understand their nature, extraction methods, fatal dose, fatal period, and associated signs and symptoms.
4. Analyze and evaluate drugs of abuse, including designer drugs, club drugs, and prohibited substances in sports. Understand their effects, modes of absorption, distribution, metabolism, and the impact of solvent abuse.
5. Demonstrate proficiency in conducting toxicological analyses and interpreting the results for different types of cases and exhibits. Apply critical thinking skills to evaluate the forensic implications of toxicological findings.

Unit I: Forensic Toxicology

Definition, dosage, administration of poisons, Classification of poisons, action of poisons and factors modifying its action. Collection and preservation of toxicological exhibits in fatal and survival cases, signs and symptoms of poisoning, mode of action and its effect on vital functions.

Unit II: Methods of Analysis in Forensic Toxicology

Introduction, types of cases/ exhibits, preliminary screening, presumptive test (colour and spot test), inorganic analysis, micro-chemical methods of analysis, Examination procedures involving standard methods and instrumental techniques.

Unit III: Pharmaceutical Drugs

Introduction to antidepressants, antipsychotics, antibiotics, tranquillizers, anti-seizure drugs; Nature, extraction (viscera, blood, vomit) Fatal dose, fatal period, signs and symptoms, Forensic significance, case studies.

Unit IV: Drugs of Abuse

Designer drugs, club drugs, Drugs of abuse in sports: Introduction, common prohibited substances. Solvent Abuse (chlorinated hydrocarbons, Aromatic hydrocarbons, alcohols, glycols): absorption, distribution, metabolism, effects, excretion and detection methods. Case studies.

Note: Candidate should complete minimum 80% of the total no. of practical.

1. Identification of adulteration in alcoholic liquor.
2. Determination of methanol and ethanol in alcoholic liquors. (Wet test, GC, TLC)
3. Estimation of ethyl alcohol in blood sample by wet test, colour test.
4. Analysis of viscera (simulated sample) for pesticides by TLC.
5. Identification of adulteration of vegetable oils by colour test, GC and HPLC.
6. Systematic analysis of pharmaceutical drugs by using HPLC.
7. Extraction and forensic identification of organic poisons from food sample by colour test, HPLC, IR-spectroscopy.
8. Extraction and forensic identification of inorganic poisons from food sample by colour test, UV-visible spectrophotometry.
9. Extraction and forensic analysis of plant poisons by chromatographic methods.
10. Extraction of poison from biological and non-biological sample by solvent extraction method.

Course Outcomes: By the end of this Course, the learners will be able to:

1. Demonstrate a comprehensive understanding of immunological principles, including the properties of antigens and antibodies, MHC restriction, and antibody diversity generation.
2. Identify and explain the classification and molecular basis of various blood group systems, such as ABO, Hh, Rh, Kell, Duffy, Kidd, Diego, Lewis, and MNS, and understand their forensic significance.
3. Analyze the organization of the eukaryotic genome, including chromatin structure, histone modifications, and the effects of chromatin remodeling on gene expression.
4. Apply appropriate methods for DNA extraction from different sample types, such as stains, tissues, hair, and blood, using organic and non-organic extraction techniques.
5. Utilize various methods for DNA quantitation, including absorbance-based quantification, intercalating and fluorescent dye-based quantification, and quantitative PCR.

Unit I: Introduction to Immunology
Properties of Antigen and antibody. Major Histo-compatibility complex and MHC restriction. Structure and functions-B-cell receptor and T-cell receptor. Generation of Antibody diversity. Complement system; Hybridoma technology. Forensic significance of Monoclonal antibodies and Polyclonal antibodies.

Unit II: Blood and its Variants
Blood group antigens the classification of blood cell antigens. Basic biochemistry, Molecular information, Blood group systems and their Forensic significance – ABO, Hh, Rh, Kell, Duffy, Kidd, Diego, Lewis, and MNS blood group systems. Significance of maternal antibodies, Hemolytic disease of the newborn (HDN) and Coombs Test. Case studies.

Unit III: Eukaryotic Genome
Genome organization-Structure of chromatin, chromosome, centromere, telomere, nucleosome, types of histones. Introduction to chromatin remodeling. Histone modifications-methylation, Acetylation, Phosphorylation and Ribosylation. DNA methylation, Effect of Chromatin remodeling on structure and function of chromatin, Repetitive and non-repetitive DNA.

Unit IV: DNA Extraction and Quantitation Methods
Sample preparation for DNA Extraction/isolation from stains, tissues, hair, nails, buccal swabs, blood, semen. Methods of DNA extraction-Organic extraction and Differential extraction. FTA cards for isolation of DNA. Silica-based extraction and Magnetic bead extraction, Non-organic DNA extraction, and CTAB and Chelex extraction. DNA quantitation Methods- Absorbance-based quantification, DNA quantitation using intercalating dyes and using fluorescent dyes, DNA quantitation using quantitative PCR. Forensic significance and case studies.

Note: Candidate should complete minimum 80% of the total no. of practical.

1. Isolation of genomic DNA from eukaryotic tissue (Blood)
2. Isolation of genomic DNA from eukaryotic tissue (Semen)
3. Isolation of genomic DNA from eukaryotic tissue (Saliva)
4. Isolation of genomic DNA from eukaryotic tissue (Muscle)
5. DNA extraction from biological samples by using FTA cards.
6. DNA quantitation by absorbance-based method.
7. Qualitative/quantitative evaluation of DNA by agarose gel electrophoresis.
8. Forensic species identification by Ouchterlony double immunodiffusion.
9. Determination of dried blood group by absorption-elution method.
10. Determination of Secretor and Non-secretor status from saliva.

Marks: 100   Lectures: 2 Hrs/Week (30 Hrs/Sem)

Course Outcomes: By the end of this Course, the learners will be able to:

1. Recall and reproduce fundamental concepts of Python programming, including data types, math operations, conditional statements, loops, and control statements.
2. Grasp the principles of string manipulation, list operations, and dictionary usage in Python. Understand the concept of functions, including their types, arguments, and scope.
3. Apply Python programming techniques to solve problems involving strings, lists, dictionaries, and text files. Implement conditional statements and loops effectively in various scenarios.
4. Break down complex problems and design functions to address them. Analyze the use of object-oriented programming (OOP) concepts.
5. Assess the appropriateness of using different data structures like strings, lists, and dictionaries for specific tasks. Evaluate the efficiency and readability of code through proper usage of functions and OOP principles.
6. Develop Python programs that integrate concepts from different units and create object-oriented programs with well-structured classes, attributes, and methods. Understand the specific forensic considerations and challenges.

Unit I: Introduction to Python Programming

Introduction to Python Programming, Numbers: Integer and Decimal Numbers, Math Operators, Order of Operations, Random Numbers, Math Functions. Conditional Statements: If, If-else, Nested if-else. Looping: For, While, Nested loops. Control Statement: Break, Continue, Pass. Uses and significance in Forensic Science.

Unit II: Strings, Lists and Dictionaries

Strings: Accessing strings, Basic operations, String slices, Functions and methods. Lists: Basics, Built-in functions, List methods. Dictionaries: Basics, Working with dictionaries, Accessing values in dictionaries, Counting words.

Unit III: Functions and Text Files

Functions: Introduction, defining a function, Calling function, Types of functions, Function Arguments, Anonymous functions, Global and local variables. Text Files: Reading from files, Writing to files, Wordplay.

Unit IV: Object Oriented Programming

Introduction to Object Oriented Programming. Classes and Objects, defining classes and creating objects. Attributes. Inheritance, Inheriting attributes and methods from a base class. Overloading. Overriding. Data hiding: Implementing data hiding using private attributes. Uses and Forensic significance. Case Studies.

Practical: Digital and Cyber Forensics

Note: Candidate should complete minimum 80% of the total no. of practical.

1. Installing python
2. Write a program in Python to display "Hello World" string on screen
3. Demonstration of constant and variables in python
4. Demonstration of operators in python
5. Demonstration of conditional statements in python
6. Demonstration of looping in python (for, while, nested)
7. To study the Function(s) in python
8. Working with lists in python
9. Working with strings in python
10. Working with dictionaries in python
11. Working with files in python
12. Python programming using object-oriented concepts

Marks: 100   **Lectures: 2 Hrs/Week (30 Hrs/Sem)**

Course Outcomes: By the end of this Course, the learners will be able to:

1. Define criminalistics and explain its role in forensic investigation, including the understanding of different types of evidence found at crime scenes and their forensic significance.
2. Apply crime scene investigation techniques, including methods for searching, locating, collecting, and preserving various types of evidence.
3. Understand the roles and responsibilities of different officers/experts, maintaining chain of custody, and proper documentation, including report writing and evidence evaluation.
4. Apply the principles and steps involved in crime scene reconstruction. Understand the use of digital aids in reconstruction, such as 3D photography and videography.
5. Understand and explain the importance of standards in forensic science, including ISO guidelines related to security, resilience, information security, risk management, environmental management, and quality management systems.
6. Evaluate and analyze the applicability and implementation of relevant ISO standards in the field of forensic science, and assess their impact on ensuring quality, security, and risk management in forensic investigations.

Unit I: Basics of Criminalistics

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

Unit II: Crime Scene Investigation

Crime Scene Search methods. Locating, Collection & Preservation of various evidences. Crime Scene Documentation (Sketching, Photography, Videography and Notes-taking). Crime Scene Management: Securing the crime scene, Contamination & cross contamination issues, Duties of various officers/experts on the crime scene, Evidence recovery log, Chain of Custody, Forwarding & Authorization letters and documentation. Report writing and Evidence Evaluation.

Unit III: Crime Scene Reconstruction

Steps (Recognition of evidence, Documentation of evidence, Collection of evidence, Evaluation of evidence, Hypothesis, Testing, Reconstruction), various crime scenes and scenarios like Hit and Run, Accidents, Hanging (Suicidal/Homicidal), Ante-Mortem and Post-Mortem drowning, Strangulation, Chocking, Shooting, Burglary. Digital Aids in Reconstruction (3-D Photography/Videography/Scanning, Computer aided Reconstruction).

Unit IV: Introduction to Standards in Forensic Science

ISO 22380, ISO 22378, ISO 22382:2018 Security and Resilience Guidelines, ISO/IEC 27000: Information Security, ISO/IEC 27000 International Guidelines for Risk Management related to various types of information, ISO 31000 Risk Management Guidelines. ISO 14001:2015 Environmental management systems-Requirements with guidance for use. ISO 9001:2015 Quality Management Systems-Requirements.

Course Outcomes: By the end of this Course, the learners will be able to:

1. Understand the principles and techniques of forensic physics, including the collection, preservation, and analysis of physical evidence for scientific examinations.
2. Apply analytical techniques such as microscopy, spectroscopy (atomic absorption, emission, infrared, UV-visible, X-ray), and elemental analysis in forensic investigations.
3. Demonstrate proficiency in evaluating and comparing tool marks and trace evidence, contributing to source correspondence and forensic linkages.
4. Explain the principles and methods of voice identification, including speech signal processing, pattern recognition, and considerations for evidence collection and evaluation.
5. Evaluate the admissibility of voice evidence in legal proceedings, considering factors such as quality, speaker variability, and transmission distortion.

Unit I: Introduction to Forensic Physics

Nature, collection, preservation & forwarding of physical evidence for scientific examinations. Role of trace evidence analysis and source correspondence. Types, characteristics and comparisons of tool marks. Forensic Significance.

Unit II: Basic Techniques

Basic Concepts of Atomic and Molecular Spectroscopy, Interaction of Radiation with Matter and Its Consequences. Reflection, Absorption, Transmission, Scattering, Emission, Fluorescence, Phosphorescence. Principle of Lasers, Transducers and their characteristics. Forensic Significance.

Unit III: Analytical Techniques

Physical matching, mechanical fit, Microscopy, atomic absorption & emission spectroscopy, infrared spectroscopy, UV-visible spectroscopy, X-ray spectroscopy, elemental analysis, 3D scanning. Forensic applications and case studies.

Unit IV: Voice Identification

Introduction to human Voice, Nature of voice and production of speech, perception of voice and speech, speech signal processing & pattern recognition. Collection of evidence, quality of evidence, type of evidence, speaker variability and simulation, transmission and channel distortion, admissibility. Forensic significance, challenges and case studies.

Marks: 100   **Practical: 4 Hrs/Week/Batch (60 hrs/Sem)**

Note: Candidate should complete minimum 80% of the total no. of practical.

1. Restoration of erased / obliterated marks.
2. Determination of particle size of Evidences.
3. Lifting of prints and impressions.
4. Study of various types of tools.
5. Study of various types of tool marks and their forensic significance.
6. Forensic examination (Comparison and matching) of various tool marks.
7. Determination of refractive indices of glass & liquids.
8. Determination of density, by density gradient tube techniques.
9. Study of Laser Characteristics.
10. Forensic analysis of Segregation of Speech Samples.
11. Study of Compound Microscope and its Forensic applications.
12. Study of Stereo Microscope and its Forensic applications.

Course Outcomes: By the end of this Course, the learners will be able to:

1. Understand the historical perspective of forensic psychology, including its global and Indian context. Analyze the concepts of mens rea, diminished capacity, competency evaluation, and legal standards such as McNaughten and Durham rules. Evaluate the ethical aspects of forensic psychology.
2. Demonstrate knowledge of the assessment and evaluation techniques used in forensic psychology.
3. Identify and understand different mental illnesses, abnormal behaviors and the roles of a forensic psychologist
4. Understand the stages and types of offender profiling and the psychological aspects related to terrorists and serial killers. Evaluate the role of gender in crime.
5. Apply critical thinking skills to analyze and interpret psychological factors relevant to forensic psychology, including understanding the psychological aspects of offenders and their motivations. Analyze case studies and empirical research in the field of forensic psychology.
6. Communicate effectively by presenting psychological assessments, evaluations, and theories related to forensic psychology. Understand the importance of clear and ethical communication in the field.

Unit I: Forensic Psychology

Historical perspective (global and Indian), functions and role of a forensic psychologist. Mens rea, diminished capacity, competency evaluation, Mc Naughten, Durham rule, testamentary capacity. Ethical aspects in Forensic Psychology. Admissibility in the court of law. Case studies.

Unit II: Assessment and Evaluation in Forensic Psychology

Tests used in Forensic Psychology: Intelligence Tests, Achievement and Aptitude Tests, Personality Tests, MMPI Test, PAI, Rorschach Test, Thematic Apperception Test, Neuropsychological tests. Forensic significance and Case studies.

Unit III: Psychopathology & Abnormal Behaviour

Introduction to different mental illnesses; insanity (real & feigned), anxiety disorders, depression, mood disorder, Delusion, hallucinations, Impulse control stress disorder, Anti-social personality disorder, psychopathic traits, post-traumatic stress disorder, Substance Abuse. Forensic significance and Case studies.

Unit IV: Psychology of Offender

Theories of Offending, Nature of Crime (Organized, Disorganized, Planned, Spontaneous), Signature, Modus Operandi. Psychological Autopsy. Stages and types of Offender Profiling, Psychological aspects related to Terrorists and Serial Killers, Gender & Crime. Forensic significance and Case studies.

Note: Candidate should complete minimum 80% of the total no. of practical.

1. To assess the personality type of a subject using the Big Five test.
2. To measure the level of adjustment of a subject using a social adjustment inventory.
3. Assessment of the depression profile of a subject, using the Mental Depression Scale.
4. To assess a subject's anxiety level using Sinha's Comprehensive Anxiety Test.
5. To measure the emotional intelligence of a subject using the Emotional Intelligence Scale.
6. To measure the Neuroticism of a subject by administering Neuroticism Questionnaire.
7. To determine the problem-solving ability of a subject using a problem-solving ability test.
8. To assess a subject's confidence level by administering Agnihotri's Self-Confidence Inventory.
9. To assess the personality type of a subject using the projective technique in the test called Rorschach Ink-blot.
10. To understand social learning theory by using Rotter's Locus of Control.
11. To measure the Life satisfaction of a subject using the Life Satisfaction Scale.
12. To gauge the social motives of a subject using the social motives scale.

M.Sc. Forensic Science Sem-I
Paper MFS1RM07- Research Methodology

Marks: 100   **Lectures: 2 Hrs/Week (30 Hrs/Sem)**

Course Outcomes: By the end of this Course, the learners will be able to:

1. Demonstrate knowledge and understanding of the research process in forensic science, including the identification and selection of research problems, formulation of objectives, research plans, and components of a research study.
2. Apply appropriate research methods and data collection tools, such as observation, interviews, questionnaires, case studies, and experiments, in conducting research in forensic science.
3. Evaluate and analyze descriptive, analytical, qualitative, quantitative, applied, fundamental, and empirical research, by reviewing research papers related to forensic science.
4. Apply statistical techniques in the field of forensic science, including descriptive statistics, measures of central tendency and dispersion, correlation analysis, significance testing, parametric and non-parametric statistics, and regression analysis.
5. Demonstrate effective communication skills by presenting research findings in various formats, such as posters, oral presentations, research articles, review articles, systematic analyses, meta-analyses, and narrative reviews.
6. Understand the importance of research report writing, including the format of research papers, review papers, and reports, proper citation procedures, awareness of plagiarism types and detection tools, and adherence to the code of ethics in scientific publishing.

Unit I: Research Fundamentals-I

Research and its Need, Identification and criteria of selecting a research problem in Forensic Science, Formulation of objectives, research plan, and its components. Literature search/review, Methods. Hypothesis: Types and formulation, Sampling: Types, steps in sample design, Rationale for using a particular sampling method. Population and sample size, sampling procedures (random and non-random) with terms of research in Forensic Science.

Unit II: Research Fundamentals-II

Types of Research: Descriptive, Analytical, Qualitative, Quantitative, Applied, Fundamental, Empirical, Ex-Post Facto. Methods of Research, Tools of Data Collection: Observation, Interview, Schedule, Questionnaire, Case Study, Experimental. Review of research paper(s) related to Forensic Science.

Unit III: Statistics in the field of Forensic Science

Introduction to Statistics in the Field of Forensic Science, Descriptive Statistics; Measures of Central Tendency; Measures of dispersion, Mean and standard deviation: Distribution of random errors, reliability of results, Frequency Distribution, confidence interval, Significance of statistics in forensic science. Correlation and its Types. Tests of Significance. Parametric and non- parametric statistics; Level of significance (Chi-square, t-test), Various non-parametric tests, ANOVA. Regression Analysis. Introduction to probability theory and distributions with reference to studies in the field of Forensic Science

Unit IV: Research Outcomes

Presentation of Research findings in the form of poster, oral presentation, research article, review article, systematic analysis, Meta analysis, Narrative Review in the field of Forensic Science. Research Report Writing: Format of research paper, review paper and report writing, Procedure of Reference Citation; Significance of writing research papers and review articles; Major Scientific publishers; Impact factor and citation matrices. Plagiarism-Types, Detection Tools, Code of Ethics.

Practical: Research Methodology

Marks: 100   **Practical: 4 Hrs/Week/Batch (60 Hrs/Sem)**

Note: Candidate should complete minimum 80% of the total no. of practical.

1. To make a research proposal by formulating objectives and hypothesis.
2. To study the application of statistics in forensic science case work/research work.
3. To perform the descriptive analysis on the given data.
4. To perform chi- square test on the given data.
5. To perform the ANOVA test on the given data.
6. To perform correlation test on the given data.
7. To study different referencing styles.
8. To study and use different tools of data collection.
9. To research relevant databases for data search/data mining.
10. Use of various plagiarism detection tools.
11. To study the format of research paper/review paper.

DSC I: Paper MFS2T01- Advanced Forensic Science

Marks: 100   **Lectures: 2 Hrs/Week (30 Hrs/Sem)**

Course Outcomes: By the end of this Course, the learners will be able to:

1. Demonstrate knowledge and understanding of footprint evidence, including casting, lifting, evaluation, analysis, and comparison with reference/control samples.
2. Understand the nature, types, and forensic significance of footwear impressions. Learn techniques for casting, lifting, evaluation, analysis, and comparison of footwear impressions with reference/control samples.
3. Identify and analyze different types of tire marks and skid marks. Learn methods for casting, lifting, evaluation, analysis, and comparison of tire marks and skid marks with reference/control samples.
4. Identify the nature, location, and types of tool marks. Understand class characteristics and individual characteristics of tool marks.
5. Identify and analyze other impression evidence, such as lip prints, ear prints, palm prints, bite marks, and rugae. Learn techniques for development, lifting, evaluation, analysis, and minutiae identification.
6. Apply techniques for examining questioned documents, including alterations, decipherment of alterations, examination of typewritten, photocopied and printed documents.

Unit I: Forensic Examination of Footprints

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. Tyre marks & Skid marks: Casting, Lifting, Evaluation, Speed of the vehicle, Analysis and comparison with reference/controlsample(s), Forensic Significance.

Unit II: Forensic Examination of Tool marks

Nature, Location, Types of tool marks, class characteristics and individual characteristics, Documentation, Collection and Forensic Examination, Photographic examination of tool marks and cut marks on clothes and walls etc. Development, Lifting, Evaluation, Analysis and comparison (mechanical fit, chemical and stereomicroscopic) with reference/control sample(s), Forensic Significance. Erased Marks & Serial Number Restoration: Method of making- cast, punch, engrave; methods of obliteration, methods of restoration on different substrates.

Unit III: Forensic Examination of Other Impression Evidence

Nature, Location, Types, Classification, Development, Lifting, Evaluation, Analysis, Minutiae Identification and comparison with reference/control sample(s), Forensic Significance of: Lip Prints, Ear Prints, Palm Prints, Bite Marks, Rugae.

Unit IV: Forensic Examination of Questioned documents

Alterations in document: Addition, deletion, substitution, obliteration in documents, techniques of decipherment of alterations. Examination of typewritten documents: Types of typewriters, typeface, parts of typewriter, and examination of typewritten document, determination of the author, ageingof document. Examination of photocopied and printed document.

Note: Candidate should complete minimum 80% of the total no. of practical.

1. To study the tools marks on/by different objects under microscope.
2. Serial number restoration on various surfaces using chemical etching method(s).
3. To examine various forensic evidences under UV lights.
4. To examine various forensic evidences under Visible lights/Transmitted light.
5. To study the surveillance system/alarm system/fire safety measures in a building.
6. To write a 'crime report'/'incidence report' of a given case.
7. To write case specific scientific report.
8. Study of types of beats in forensic journalism.
9. To study the types of news and headlines.
10. To evaluate the role of media in trials with a case study.
11. Forensic examination of typewritten/printed document.

Marks: 100   Lectures: 2 Hrs/Week (30 Hrs/Sem)

Course Outcomes: By the end of this Course, the learners will be able to:

1. Classify and describe the medico-legal significance of pesticides and insecticides.
2. Explain the chemistry and physics of fire, including fire behavior, the fire triangle, types of fire, modes of fire production, and the sequence and direction of room fires. Analyze the crime scene of fire and arson cases, establish the origin of fire, and interpret patterns and surface effects of char.
3. Describe the nature, classification, composition, characteristics, and hazards associated with explosives, including pyrotechnics, IEDs, commonly used explosive devices, explosion processes, and the effects of blast waves on structures.
4. Identify and analyze petroleum products, including gasoline, diesel, and engine oils, and understand the detection of adulterants in these products.
5. Apply knowledge and analytical skills to evaluate and interpret forensic evidence related to pesticides and insecticides, fire and arson, explosives, and petroleum products.
6. Communicate effectively by presenting analyses, interpretations, and conclusions related to the forensic analysis of pesticides and insecticides, fire and arson, explosives, and petroleum products, both orally and in written reports

Unit I: Pesticides and Insecticides

Classification, nature, fatal dose, fatal period, symptoms, post-mortem findings, medico legal significance and analysis of Organophosphorus, Organochlorine, Carbamate and Pyrethroids insecticides and pesticides. Forensic Significance and case studies.

Unit II: Fire and Arson

Fire, chemistry and physics of fire, fire behaviour, fire triangle, types of fire, modes of production of fire, Room fire sequence, direction of fire, incendiary devices, fire extinguishers, Analysis of fire/arson crime scene, establishing the origin of fire, patterns and surface effects of char. Forensic significance and case studies.

Unit III: Explosives

Nature, Classification, Composition and characteristics of Explosive, pyrotechnics, IEDs, commonly used Explosive devices, Explosion process and effects, types of hazards, effect of blast-wave on structures. Oxygen balance of explosives. Explosives and environment. Forensic significance and case studies.

Unit IV: Petroleum Products

Petroleum Products, Adulterants, Detection of adulterants of gasoline, diesel and engine oils. Analysis of recycled engine oils, Analysis of dyes of petrol and kerosene, engine oils, detection of adulteration by Flash point, boiling point, ignition method and distillation method. Forensic Significance and case studies.

Marks: 50

Practical: 2 Hrs/Week/Batch (30 Hrs/Sem)

Note: Candidate should complete minimum 80% of the total no. of practical.

1. Forensic analysis of Pesticide residues by HPLC, TLC, GC, FT-IR.
2. Identification of adulteration in petroleum product.
3. Identification of adulteration of food products by colour test, GC and HPLC.
4. Systematic analysis of pharmaceutical drugs by using TLC/HPLC.
5. Collection and analysis of explosion residues by chemical methods.
6. Forensic analysis of explosion residues by HPLC, TLC, GC, FT-IR.
7. Collection and analysis of fire/ arson residues by chemical methods.
8. Forensic analysis of fire/ arson samples by GC, TLC.
9. Forensic analysis of pesticides by colour test and instrumental technique.
10. Forensic analysis of chemicals involved in trap cases by TLC, HPLC.

M.Sc. Forensic Science Sem-II
DSC III: Paper MFS2T03- Forensic Biology and Serology

Marks: 100

Lectures: 2 Hrs/Week (30 Hrs/Sem)

Course Outcomes: By the end of this Course, the learners will be able to:

1. Demonstrate a comprehensive understanding of the chromosomal basis of inheritance, including karyotyping, chromosome banding patterns, sex chromosomes, and chromosomal variations and its significance in forensic science.
2. Analyze the forensic significance of non-disjunction of X chromosomes, sex determination systems, and the Human Genome Project (HGP).
3. Explain the concepts of catabolism and anabolism, and the metabolic pathways involved, such as glycolysis, Kreb's cycle, gluconeogenesis, and the metabolism of cholesterol. Discuss the forensic significance of ketone bodies and the urea cycle.
4. Perform immunology techniques and assays such as immunodiffusion and immunoelectrophoretic methods. Use these techniques for forensic species identification in case work.
5. Understand the morphological and biochemical importance of microbial agents in forensic science

Unit I: Chromosomal Basis of Inheritance

Karyotype and ideogram, Chromosome banding pattern, Sex chromosomes and sex linkage, X linked inheritance and Y- linked inheritance, Chromosomal Variations/Aberrations, non-disjunction of X chromosomes, Sex determination systems, Human Genome Project (HGP)- Scope, Forensic Significance & ethical issues

Unit II: Concepts of Metabolism

Concept of catabolism and anabolism, Glycolysis, Kreb's cycle and Glyoxylate cycle, Gluconeogenesis, Ketone bodies (Formation and Forensic significance). Metabolism of cholesterol (Biosynthesis of cholesterol and its regulation), Urea cycle.

Unit III: Immunology Techniques in Forensics

Antigen and antibody interactions; Primary and secondary. Primary Binding assays (ELISA). Agglutination, Precipitation/flocculation assay, Immunochromatographic assay, Precipitation based assays- Immunodiffusion (Single and Double immunodiffusion), Immunoelectrophoretic methods, Species identification using various methods. Forensic significance, advantages and disadvantages.

Unit-IV: Microbial Forensics

Morphological & biochemical importance of - *Bacillus anthracis, Yersinia pestis, Francisella tularensis, Clostridium botulinum*. Fungi of forensic importance: Opportunistic mycoses, *Aspergillus fumigates, Pneumocytosis jiroveci, Asp. flavus & Candida species*, Food borne – *Shigella, Salmonella*.

Marks: 50   **Practical: 2 Hrs/Week/Batch (30 Hrs/Sem)**

Note: Candidate should complete minimum 80% of the total no. of practical.

1. Preparation of culture media for growth of forensically significant microbes
2. Simple and differential staining of Bacteria.
3. Staining of fungi from various sources.
4. Culturing of food-borne bacteria from infected food samples.
5. Detection antigen/antibody by ELISA in various biological samples.
6. Determination of species by Immuno-electrophoresis in various biological samples.
7. Detection of ketone bodies from urine/blood.
8. Detection of urea from blood/urine.
9. Detection of glucose from blood/urine.
10. Thin layer chromatography of carbohydrates (simple)
11. DNA extraction of bacteria/fungi.

Marks: 100

Lectures: 2 Hrs/Week (30 Hrs/Sem)

Course Outcomes: By the end of this Course, the learners will be able to:

1. Recall and recognize fundamental concepts in digital forensics, including legal frameworks, cybercrime investigation techniques.
2. Understand and comprehend the principles underlying various aspects of digital forensics, such as information security, database protection, and immunology techniques.
3. Apply and utilize investigative methods and techniques to conduct examinations of Windows and Unix systems, analyze logs, perform keyword searches, and detect unauthorized access points.
4. Break down complex scenarios involving network security, cloud computing, and eukaryotic genome organization, and evaluate potential forensic implications.
5. Develop strategies for investigating cybercrimes, managing information security risks, and conducting microbial forensic analyses.

Unit I: Forensic Investigation of Windows Systems- I

Where Evidence Resides on Windows Systems, Conducting a Windows Investigation: Reviewing All Pertinent Logs, Performing Keyword Searches, Reviewing Relevant Files, Identifying Unauthorized User Accounts or Groups, Identifying Rogue Processes, Looking for Unusual or Hidden Files, Checking for Unauthorized Access Points

Unit II: Forensic Investigation of Windows Systems - II

Examining Jobs Run by the Scheduler Service. Analyzing Trust Relationships. Reviewing Security Identifiers (SIDs). File Auditing and Theft of Information. Handling the Departing Employee, Reviewing Searches and Files Used, Conducting String Searches on Hard Drives.

Unit III: Forensic Investigation of Unix Systems - I

An Overview of the Steps in a Unix Investigation. Reviewing Pertinent Logs: Network Logging, Host Logging, User Activity Logging. Performing Keyword Searches: String Searches with grep, File Searches with find. Reviewing Relevant Files: Incident Time and Time/Date Stamps, Special Files

Unit IV: Forensic Investigation of Unix Systems - II

Identifying Unauthorized User Accounts or Groups: User Account Investigation, Group Account Investigation. Identifying Rogue Processes. Checking for Unauthorized Access Points. Analyzing Trust Relationships. Detecting Trojan Loadable Kernel Modules: LKMs on Live Systems, LKM Elements, LKM Detection Utilities.

Practical: Digital and Cyber Forensics

Marks: 50   **Practical: 2 Hrs/Week/Batch (30 Hrs/Sem)**

Note: Candidate should complete minimum 80% of the total no. of practical.

1. Structure of HTML: Creating webpage using Structure of HTML.
2. Speaker identification and verification using speaker verification tool.
3. Study of wireless devices.
4. Study of wireless networks and wireless network analysis.
5. Understanding dynamic and static pages, Viewing HTML Source and HTTP Headers,
6. Understanding Header Information.
7. Working with Wireshark for Network analysis.
8. Studying of packets and packet formats.
9. Logs collection and their forensic analysis.
10. Network evidence collection offline and online.
11. Intrusion detection and prevention configuration
12. Implementing Web Data Extractor and Web site watcher.

Marks: 100

Lectures: 2 Hrs/Week (30 Hrs/Sem)

Course Outcomes: By the end of this Course, the learners will be able to:

1. Identify and analyze various methods and techniques used in detecting smuggling at airports, including the concealment methods and their detection, forensic radiology, identification of counterfeit goods, and the forensic application of different types of light sources.
2. Understand the principles and scope of forensic journalism, including the fundamentals of crime reporting, editing, and writing, the role of forensic journalism in criminal cases, the impact of media on case outcomes, and the ethical considerations related to media trial and branding of suspects/victims/accused.
3. Evaluate and analyze the importance of forensic security measures, including preventive forensics, safety gadgets, alarm systems, surveillance systems, fire precautions, fire audits, and the role of internal security in India.
4. Explore and assess recent advancements in forensic science, such as crime scene documentation techniques, the use of drones in forensic investigations, 3D printing applications, and the field of environmental forensics, including the disposal and impact of e-waste and preventive forensics.
5. Apply critical thinking skills to analyze and solve complex problems related to smuggling detection, forensic journalism, forensic security, and advancements in forensic science through case studies, practical exercises, and research projects.
6. Demonstrate effective communication skills by presenting findings, analysis, and recommendations related to topics covered in the course, both in oral and written formats.

Unit I: Lights in Forensic Science

Lights in Forensic Science: Gamma rays, UV, X-Ray, Visible Rays, IR Rays, Microwaves, Radio waves in Forensic Science, Types of X-Rays, difference betweenhard and soft x-ray, Forensic application of X-rays, light sources for detection of various evidences such as latent fingerprint, body fluids, secret writing, hair, fibre, injury. Smuggling at airport: Various types of smuggling, methods of concealment and their detection, Forensic Radiology, identification of counterfeit goods, crypto currency, block chain.

Unit II: Forensic Journalism

Introduction, History, Need and Scope of Forensic Journalism, Fundamentals of crime reporting, editing, and writing, Forensic journalism in criminal cases, photography in crime investigation. Role of journalism in Police investigation. Case studies for importance of role of Forensic journalism. Role of Media on the outcome of cases. Media trial, branding/labelling of the suspects/victims/accused, effect on the society.

Unit III: Forensic Security

Preventive Forensics and their aids, safety gadgets, alarm systems, surveillance systems, Fire precautions, Fire audit, safety of buildings. Need and Scope of internal security of India, Defence against internal and external threats. Surveillance and counter surveillance, honey traps, Ports security.

Unit IV: Advancement in Forensic Science

Recent Advances in Crime Scene Documentation, Drone Forensics: Introduction, Working Mechanism and Types of Drones, Crimes involving Drone, 3D Printing in Forensic Science: Introduction, Types, Role and Applications. Environmental Forensics: Introduction, Disposal and Impact of E-Waste, E-Waste and Crime, Preventive Forensics.

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DSE A: Paper MFS2T06A- Forensic Physics & Ballistics

Marks: 100

Lectures: 2 Hrs/Week (30 Hrs/Sem)

Course Outcomes: By the end of this Course, the learners will be able to:

1. Understand the principles and techniques of photography, including light and illumination, camera components and working, types of camera lenses, image sensors, reproduction of colors, and modern developments in photography.
2. Apply the concepts of exposure, F-number, depth of field, and ISO to achieve desired photographic results.
3. Demonstrate knowledge of accident investigation and analysis in road accidents, including the primary causes, types, and methods of accident reconstruction. Understand strategies for accident prevention.
4. Explain the fundamentals of ballistics, including internal, external, and terminal ballistics. Identify and classify firearms, understand their components, and analyze the characteristics of smooth bore firearms and rifling.
5. Describe the types, constructional features, and characteristics of ammunition, including cartridges, primers, propellants, and bullets.
6. Analyze and identify the origin of projectiles and ammunition. Understand safety protocols and handling procedures for firearms and ammunition.

Unit I: Photography

Light and Illumination, Cameras and its working, types of camera lenses, Image sensors, spectral sensitivity of photographic materials, reproduction of colours, photographic processing, Camera exposure, F-Number, Depth of field, ISO, Modern Developments in Photography.

Unit II: Forensic Investigation of Road Accidents

Road design, Speed limit, Banking of roads, Breaking distance, Types of roads, Forensic investigation of Accident and Hit & Run cases, Primary Causes of Road Accidents, Types of Road Accidents, Analysis, Reconstruction & prevention of Accidents, Airbag mechanism & injuries.

Unit III: Forensic Ballistics - I

Introduction, History and scope, Internal, External and Terminal Ballistics. classification and characteristics of firearms, components of firearms. Characteristics of smooth bore firearms, purpose of rifling, types of rifling and methods to produce rifling, trigger and firing mechanism.

Unit IV: Forensic Ballistics - II

Types and classification of ammunition, Constructional features and characteristics of different types of cartridges, types of primers and priming composition, propellants and their compositions, various types of bullet and compositional aspects, latest trends in their manufacturing and design projectile, identification of origin, improvised ammunition and safety aspects for handling firearm and ammunition.

Practical: Forensic Physics and Ballistics

Marks: 100   **Practical: 4 Hrs/Week/Batch (60 Hrs/Sem)**

Note: Candidate should complete minimum 80% of the total no. of practical.

1. Accident reconstruction sample calculations.
2. Velocity estimation from skid marks.
3. Forensic examination of Tyre marks
4. Forensic examination of Skid marks/Other Marks.
5. Forensic examination of vehicle identification numbers.
6. Forensic identification and examination of firearms.
7. Forensic identification and examination of cartridge/cartridge case.
8. Forensic identification and examination of bullets.
9. Study of caliber and rifling characteristics.
10. Forensic examination of class and individual characteristics of fired bullets.
11. Forensic examination and comparison of fired cartridges/cases.
12. Twist versus Muzzle Velocity (Sample Calculations) and Muzzle Velocity (Sample Calculations)
13. Study of Photographic Techniques using SLR/ Digital Camera.

Marks: 100   **Lectures: 2 Hrs/Week (30 Hrs/Sem)**

Course Outcomes: By the end of this Course, the learners will be able to:

1. Understand the importance of investigative interviewing and the influence of psychology on the interview process. Apply the P.E.A.C.E model of interviewing, cognitive interviewing techniques, and ethical considerations in conducting interviews.
2. Demonstrate knowledge and understanding of polygraph/lie detector test, brain fingerprinting/brain-mapping, narco-analysis, brain electrical oscillation signature profiling (BEOS) and voice-stress analysis/layered voice analysis.
3. Define juvenile delinquency and understand the nature, extent, and historical overview of juvenile offending. Evaluate various approaches to the rehabilitation of juveniles and understand the concepts of juvenile corrections.
4. Analyze the concepts of competency to stand trial, rehabilitation, and correctional treatment of offenders and victims. Understand the techniques, strategies, and guidelines related to correctional aspects in forensic science.
5. Communicate effectively by presenting the theories, techniques, and applications of investigative interviewing, interrogation techniques, and various tests and techniques used in forensic settings. Understand the ethical considerations and legal implications associated with these practices.

Unit I: Interviewing and Interrogation Techniques

Interviewing and Interrogation Techniques: Importance of Investigative Interviewing, Influence of Psychology, P.E.A.C.E Model of Interviewing, Cognitive Interviewing, Ethical Interviewing, Other Interview Techniques. Interrogation and the related Techniques.

Unit II: Advanced Forensic Interrogation and Psychological Assessment Techniques

Polygraph/Lie Detector Test: Objectives, theoretical basis, stages of examination (Pre-test, In-test, post-test), Questioning techniques, Limitations, Admissibility in the court of law. Brain Fingerprinting/Brain-Mapping: Principle, Importance, History, process, brain waves (P300, delta, theta, gamma, alpha), reliability, case studies, admissibility. Narco-analysis: Principle, History, drugs used, procedure, reliability, admissibility, limitations, Indian scenario. Brain Electrical Oscillation Signature Profiling (BEOS), Voice-Stress Analysis/ Layered Voice Analysis, reliability, Admissibility, Limitations. Case Studies.

Unit III: Juvenile Delinquency

Definition of Juvenile delinquency, nature and extent of juvenile offending, Juvenile Corrections, Historical overview of juvenile rehabilitation, various approaches to the rehabilitation of juveniles. Dealing with Juveniles in conflict with the law. Dealing with Juveniles in need of care and protection.

Unit IV: Correctional Psychology

Correctional Aspects: Competency to stand trial, Rehabilitation & Correctional Treatment of Offender(s)/ Victim(s), and correctional officers, Techniques, and Strategies. Victimology-Types and classification of victims. NHRC guidelines.

Marks: 100   **Practical: 4 Hrs/Week/Batch (60 Hrs/Sem)**

Note: Candidate should complete minimum 80% of the total no. of practical.

1. To assess the personality of a subject using a test based on the theory of Carl Jung's theory of Introversion-Extraversion.
2. To measure adjustment of a subject using Adjustment Inventory for College Students.
3. To administer the Mental Status Examination test on a subject.
4. To measure the emotional maturity of a subject using the Emotional Maturity Scale.
5. To assess the personality test of a subject using Thematic Apperception Test.
6. To measure the non-verbal intelligence of a subject.
7. To gauge the prejudice of a subject using the Prejudice Scale.
8. To measure the social motives of a subject using the social motives scale.
9. To demonstrate and understand the working of polygraph testing of a subject.
10. To measure the self-esteem of a subject using Rosenberg's Self-esteem scale.
11. To assess the anxiety, depression and stress of a subject by administering the Anxiety, Depression, and Stress scale.
12. To assess resilience of a subject using The Resilience Scale by Wagnild and Young.

Marks: 100

Practical: 120 hours

(To be carried, out in accordance with the Instructions/Guidelines/Notification issued by Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur)

1. Every student admitted to M.Sc. Second Semester is compulsorily required to undergo this course bearing 4 credits.
2. During second semester, all students will have to undergo OJT/Internship/FP of 120 Hours.
3. Each student will be required to submit a detailed report to the Department/ College/ Institute for the work undertaken during this period within 7 days of completion of the training following which the evaluation and assessment for OJT/Internship/FP will be done by the college/institute concerned. The Report submitted must be according to the Learning outcomes and in tune with the rubric for evaluation.
4. The Internal Examiner and External Examiner shall jointly evaluate the report submitted by the student and her/his seminar and shall immediately submit the evaluation report in the prescribed format.

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

M.Sc. Forensic Science (As per NEP-2020)

Two Year (Four Semester Degree Course)

Semester I - IV
Teaching and Examination Scheme

Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur

(Two Year) M.Sc. Forensic Science (As per NEP-2020)

Academic Session 2023-24 Onwards

Scheme of Teaching & Examination
M.Sc. Forensic Science Sem-I

S N	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme							
				(Th)	TU	P			Theory				Practical		
								Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	Advanced Forensic Science	MFS1T01	2	-	2	3	3	80	20	40	25	25	25
2	DSC	Forensic Chemistry and Toxicology	MFS1T02	2	-	2	3	3	80	20	40	25	25	25
3	DSC	Forensic Biology and Serology	MFS1T03	2	-	2	3	3	80	20	40	25	25	25
4	DSC	Digital and Cyber Forensics	MFS1T04	2	-	2	3	3	80	20	40	25	25	25
5	DSC	Criminalistics	MFS1T05	2	-	-	2	3	80	20	40	-	-	-
6	DSE	Forensic Physics and Ballistics /	MFS1T06A /	2	-	4	4	3	80	20	40	50	50	50
		Forensic Psychology	MFS1T06B											
7	RM	Research Methodology	MFS1RM	2	-	4	4	3	80	20	40	50	50	50
		Total		14	-	16	22		560	140		200	200	

M.Sc. Forensic Science Sem-II

S N	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme							
				(Th)	TU	P			Theory				Practical		
								Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	Advanced Forensic Science	MFS2T01	2	-	2	3	3	80	20	40	25	25	25
2	DSC	Forensic Chemistry and Toxicology	MFS2T02	2	-	2	3	3	80	20	40	25	25	25
3	DSC	Forensic Biology and Serology	MFS2T03	2	-	2	3	3	80	20	40	25	25	25
4	DSC	Digital and Cyber Forensics	MFS2T04	2	-	2	3	3	80	20	40	25	25	25
5	DSC	Criminalistics	MFS2T05	2	-	-	2	3	80	20	40	-	-	-
6	DSE	Forensic Physics and Ballistics /	MFS2T06A / MFS2T06B	2	-	4	4	3	80	20	40	50	50	50
		Forensic Psychology												
7	OJT	OJT/FP	MFS2OJT	-	-	8	4	-	-	-	-	50	50	50
		Total		12	-	20	22		480	120		200	200	

Abbreviations:

DSC: Discipline Specific Core, DSE: Discipline Specific Elective, RM: Research Methodology, Th: Theory, P: Practical, OJT: On-the-Job Training (Internship/Apprenticeship), FP: Field Project, SEE: Semester End Examination, CIE: Continuous Internal Evaluation, RP: Research Project

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M.Sc. Forensic Science Sem-III

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
									Theory			Practical		
				(Th)	TU	P		Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	SP-I/ SP-II/SP-III/SP-IV/SP-V	MFS3T01 A/B/C/D/E	2	-	-	2	3	80	20	40	-	-	-
2	DSC	SP-I/ SP-II/SP-III/SP-IV/SP-V	MFS3T02 A/B/C/D/E	2	-	-	2	3	80	20	40	-	-	-
3	DSC	SP-I/ SP-II/SP-III/SP-IV/SP-V	MFS3T03 A/B/C/D/E	2	-	-	2	3	80	20	40	-	-	-
4	DSC	SP-I/ SP-II/SP-III/SP-IV/SP-V	MFS3T04 A/B/C/D/E	2	-	-	2	3	80	20	40	-	-	-
5	DSC	Practical (Related to Specialization)	MFS3P01 A/B/C/D/E	-	-	8	4	-	-	-	-	100	100	100
6	DSC	Law	MFS3T05 A/B/C/D/E	2	-	-	2	3	80	20	40	-	-	-
7	DSE	Related to Specialization	MFS3T06 A/B/C/D/E	2	-	4	4	3	80	20	40	50	50	50
8	OJT	RP	MFS3RP	-	-	8	4	-	-	-	-	50	50	50
	Total			12	-	20	22		480	120		200	200	

M.Sc. Forensic Science Sem IV

SN	Course Category	Name of Course	Course Code	Teaching Scheme (hrs.)			Total Credit	Examination Scheme						
									Theory			Practical		
				(Th)	TU	P		Exam Hrs.	SEE	CIE	Min.	SEE	CIE	Min.
1	DSC	SP-I/ SP-II/SP-III/SP-IV/SP-V	MFS4T01 A/B/C/D/E	2	-	-	2	3	80	20	40	-	-	-
2	DSC	SP-I/ SP-II/SP-III/SP-IV/SP-V	MFS4T02 A/B/C/D/E	2	-	-	2	3	80	20	40	-	-	-
3	DSC	SP-I/ SP-II/SP-III/SP-IV/SP-V	MFS4T03 A/B/C/D/E	2	-	-	2	3	80	20	40	-	-	-
4	DSC	SP-I/ SP-II/SP-III/SP-IV/SP-V	MFS4T04 A/B/C/D/E	2	-	-	2	3	80	20	40	-	-	-
5	DSC	Practical (Related to Specialization)	MFS4P01 A/B/C/D/E	-	-	4	2	-	-	-	-	50	50	50
6	DSC	Law	MFS4T05 A/B/C/D/E	2	-	-	2	3	80	20	40	-	-	-
7	DSE	Related to Specialization	MFS4T06 A/B/C/D/E	2	-	4	4	3	80	20	40	50	50	50
8	OJT	RP	MFS4RP	-	-	12	6	-	-	-	-	100	100	100
	Total			12	-	20	22		480	120		200	200	

SP-I: Questioned Documents & Fingerprints
SP-II: Forensic Chemistry & Toxicology
SP-III: Forensic Biology & Serology
SP-IV: Digital & Cyber Forensics
SP-V: Forensic Physics & Ballistics

{Note: The learner shall choose any one Specialization at the beginning of Semester III and shall opt for the related papers and RP accordingly in Semester III & IV}