SHRI VAISHNAV VIDHYAPEETH VISHVAVIDHYALAYA, INDORE

M.Sc. / B.Sc.-M.Sc. (Forensic Science) CBCS

Semester-I / VII (M.Sc. / B.Sc.-M.Sc.)
Name of Program M.Sc. / B.Sc.-M.Sc. (Forensic Science)

Code	Category	Subject Name	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	Credits
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
MSCFS–101	DC	Forensic Science, Photography, Crime Scene Management	60	20	20	30	20	4	1	2	6

Legends: **L** - Lect; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.**

Learning Objectives: After studying this paper the students will know –

1. Organizational set up of a Forensic Science Laboratory.
2. Basic Principles, Tools and Techniques in Forensic Science.
3. Basic Principles and Techniques of Photography.
4. Report writing and crime scene Management.

Unit 1 : Forensic Science

Introduction, Need, Scope, Concepts and Significance of Forensic Science, History and Development of Forensic Science, Laws and Basic principles of Forensic Science, Branches of forensic science, Organizational set-up of a Forensic Science Laboratory. Investigative strategies. Expert testimony and eye-witness report.

Unit 2: Tools and techniques in Forensic Science

Basic principles of microscopy, spectroscopy, chromatography. Electrophoresis, Enzyme-Linked Immunosorbent Assay (ELISA), Radio Immuno Assay (RIA). Measuring and optical instrumenmts.

Unit 3 : Research methodologies

Research methodologies. Formation of research design on a specific problem. Central tendency and Dispersion. Test of significance. Analysis of variance. Correlation and Regression.

Unit 4: Forensic Photography

Basic principles of Photography, Techniques of black & white and color photography, cameras, lenses, shutters, depth of field, film; exposing, development and printing techniques; Different kinds of developers and fixers; UV, IR, fluorescence illumination guided photography; Modern

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development in photography- digital photography, working and basic principles of digital photography; Surveillance photography. Videography and Crime Scene &laboratory photography.

Unit 5: Crime Scene Management

Crime scene investigations, protecting and isolating the crime scene; Documentation, sketching, field notes and photography. Searching, handling and collection, preservation and transportation of physical evidences. Chain of custody andReconstruction of scene of crime. Report writing.

Practicals:

1. Descriptive study of organizational structure of a forensic science laboratory.
2. Photography of crime scene using manual and digital camera.
3. Basics of crime scene sketching
4. To carry out sketching of indoor crime scene.
5. To carry out sketching of outdoor crime scene.
6. Methods for Searching of physical evidences at scene of crime.
7. Collection, packing, labeling, forwarding of physical evidences from scene of crime to forensic science laboratory.

Suggested Readings

1. Houck, M.M & Siegel, J.A; Fundamentals of Forensic Science, Acadamic Press, London, 2006.
2. Sharma, B.R; Forensic Science in Criminal Investigation & Trials, Universal Publishing Co., New Delhi, 2003
3. Nanda B.B and Tewari, R.K; Forensic Science in India- A vision for the Twenty First Century, Select Publisher, New Delhi, 2001.
4. James, S.H and Nordby, J.J; Forensic Science- An Introduction to Scientific and Investigative Techniques, CRC Press, USA, 2003.
5. Saferstein; Criminalistics- An Introduction of Forensic Science, Prentice Hall Inc, USA,2007.
6. Barry, A.J. Fisher; Techniques of Crime Scene Investigation, 7th Ed, CRC Press, NewYork, 2003.
7. Mordby, J. & Reckoning, D; The Art of Forensic Detection, CRC Press NewYork, 2003.
8. G.R. Chatwal; Analytical Spectroscopy 2nd Edn, Himalaya Publishing House New Delhi,2002.
9. Aitken and Stoney; The Use of Statistics in Forensic Science, Ellis Horwood, New York, 1991.
10. Robertson and Vignaux; Interpreting Evidence, John Wiley, New York, 1995.
11. H.L. Blitzer and J.Jacobia; Forensic Digital Imaging and Photography, Academic Press, London, 2002
12. David R.Redsicker; The Practical Methodology of Forensic Photography- 2nd Ed. CRC Press, New York, 2001.
13. R.E.Jacobson, S.F.Ray, G.G.Attridge; The Manual of Photography- Photographic and Digital Imaging , N.R. Oxford

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Semester-I / VII (M.Sc. / B.Sc.-M.Sc.)
Name of Program M.Sc. / B.Sc.-M.Sc. (Forensic Science)

Subject Code	Category	Subject Name	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	Credits
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
MSCFS–102	DC	Forensic Dermatoglyphics and other impressions	60	20	20	30	20	4	1	2	6

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.**

Learning Objectives: After studying this paper the students will know –

1 Modern methodologies in finger printing.
2 History and development of Dermatoglyphics.
3 Automated finger print identification system.
4 Modern techniques of Foot prints, tip prints and Ear prints.

Unit 1: Fingerprints and Palm prints I

History and development of Dermatoglyphics , formation of ridges, pattern types, pattern area. Classification of fingerprints- Henry's system of classification, single-digit classification, Extension of Henry's classification, filing, searching and fingerprint bureau. Composition of sweat, development of chance, latent, visible and plastic prints. Taking of fingerprints from living and dead person, preserving and lifting of fingerprints, photography of fingerprints. Ridge counting and ridge tracing, class and individual characteristics, various types of ridge characteristics. Comparison of palm prints on the basis of individual ridge characteristics.

Unit 2: Fingerprints and Palm prints II

Conventional methods of development of latent prints- fluorescent methods, magnetic powder method, fuming method, chemical method etc. Application of laser and other radiations to develop latent fingerprints, metal deposition method and development of latent prints on skin. Automated Fingerprint Identification System (AFIS). Modern methodologies in fingerprinting.

Unit 3: Biometrics

Biometric evidences such as finger impressions, retina, iris pattern, voice, gait pattern, face recognition, 3D face recognition, automatic forensic dental identification, hand vascular pattern technology, Multibiometric systems, Recent developments, biometric databases.

Unit 4: Foot/ Footwear/Tyre impressions

Importance, Gait pattern, Casting of footprints in different medium, electrostatic lifting of

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latent footprints. Taking of control samples.Collection, tracing, lifting, casting of impressions, enhancement of footwear impressions, analysis and comparison of foot impressions, moulds, identification characteristics.

Unit 5: Lip prints, Ear prints and their significance

Nature, location, collection and evaluation of lip prints. Forensic Significance, photography, location, collection and evaluation, taking of control samples of footprints, lip prints and Ear prints for comparison. Modern techniques and developments.

Practicals:

1. Print your own 10 digit fingerprint card using black ink.
2. Primary and secondary classification of given finger print chart.
3. Identification of ridge characteristics.
4. Comparison of fingerprints by individual and class characteristics.
5. Development and lifting of latent fingerprints using various powders.
6. Development of latent fingerprint using iodine fuming method.
7. Development of latent fingerprint using chemical methods.
8. Documentation of Fingerprint evidence.
9. Casting and matching of foot/footwear print on soft surface.
10. Comparison and identification of individuals from lip print evidence.

Suggested Readings

1. Bridges, B.C; Criminal Investigation, Practical Fingerprinting, Thumb Impression, Handwriting expert Testimony, Opinion Evidence., Univ. Book Agency, Allhabad,2000.
2. Mehta, M.K; Indentification of Thumb impression & cross examination of Fingerprints, N.M. Tripathi Pub. Bombay, 1980.
3. Chatterjee, S.K; Speculation in Fingerprint Identification, Jantralekha printing Works, Kolkata, 1981.
4. Cowger James F; Friction Ridge Skin- Comparison & Identification of Fingerprints, CRC Press, NY, 1993.
5. Cossidy, M.J; Footwear Identification, Royal Canadian, Mounted Police, 1980.
6. Iannavelli, A.V; Ear Identification, Forensic Identification Series, Paramount,1989.
7. Henry, C.L. & Ganesslen, R.E; Advances in Fingerprint Technology, CRC Press, London,1991.
8. Jain, A.K., Flynn, P.& Ross A.A., Handbook of Biometrics, Springer, New York 2008

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****Semester-III / IX (M.Sc. / B.Sc.-M.Sc.)**
Name of Program M.Sc. / B.Sc.-M.Sc. (Forensic Science)

Subject Code	Category	Subject Name	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	Credits
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
MSCFS – 103	DC	Forensic Physics	60	20	20	30	20	4	1	2	6

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***Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.**

Learning Objectives: After studying this paper the students will know –

1. Types of glass and their composition.
2. Forensic aspects of fibre examination.
3. Photographic examination of tool marks.

Unit 1: Soil, Cement and Concrete
Types and composition of soil, sample preparation, removal of contaminants, colour, molecular particle size distribution, turbidity test, pH measurements, microscopic examination, density gradient analysis, ignition-loss test, elemental analysis, interpretation of soil evidence. Cement-bromoform test, fineness test, ignition-loss test. Identification of adulterated cement. Mortar and concrete analysis.

Unit 2: Paint
Types of paint and their composition, macroscopic and microscopic analysis of paint pigments, pigment distribution, micro-chemical analysis- solubility test, pyrolysis gas chromatography, TLC, colorimetric analysis, IR spectroscopy and X-ray diffraction, elemental analysis, mass spectrometer, interpretation of paint evidence.

Unit 3: Fibre
Types of fibres, forensic aspects of fibre examination- fluorescence, optical properties, refractive index, birefringence, dye analysis. Physical fit and chemical testing. TLC, IR-micro spectroscopy, Py-MS. Difference between natural and man-made fibres.

Unit 4: Glass
Types of glass and their composition-soda-lime, boro-silicate, safety glass, laminated, light-sensitive, tampered/ toughened, wire glass, coloured glass. Matching and comparison. Forensic

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examinations of glass fractures- rib marks, hackle marks, cone fracture, wavy, backward fragmentation, concentric and radial fractures. Colour, fluorescence, physical measurements, refractive index, density gradient, becke-line, specific gravity examination and elemental analysis of glass evidence.

Unit 5: Toolmarks

Types of toolmarks- compression marks, striated marks, combination of compression and striated marks, repeated marks, class characteristics and individual characteristics, tracing and lifting of marks, Photographic examination of tool marks and cut marks on clothes and walls etc. Restoration of erased / obliterated marks- Method of making-cast, punch, engrave; methods of obliteration, method of restoration- etching (etchings for different metals), magnetic, electrolytic etc., recording of restored marks – restoration of marks on wood, leather, polymer etc.

Practicals:

1. Microscopic examination of soil.
2. Particle size distribution of soil sample.
3. Identification and matching of soil sample by density gradient method.
4. P^H measurement of soil sample
5. Microscopic examination of Paint.
6. Physical matching of cloth sample.
7. Examination of glass.
8. Examination of glass fracture.
9. Examination and Comparison of tool marks.
10. Restoration of erased/obliterated punch marks.

Suggested Readings:

1. Caddy, B; Forensic Examination of Glass and Paint Analysis and Interpretation, CRC Press, New York, 2001.
2. Shaw, D; Physics in the Prevention and Detection of Crime, Contem Phys. Vol.17, 1976.
3. Saferstein, R; Forensic Science Handbook. Vol. I,II, (Ed.), Prentice Hall, New Jersey, 1988.
4. Working Procedure Manual; Physics BPR&D Publication, 2000.
5. Sharma, B.R; Forensic Science in Criminal Investigation and Trials (3rd Ed.), Universal Law Publishing Co., New Delhi, 2001.
6. Working Procedure Manual- Physics, BPR&D Publication. 2000
7. Hess, K.P; Textile Fibers and their Use, 6th Edn, Oxford and IBH Publishing Co., 1974.

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Semester-I / VII (M.Sc. / B.Sc.-M.Sc.)
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Subject Code	Category	Subject Name	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	Credits
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
MSCFS–104	DC	Criminology, Criminal Law and Police Administration	60	20	20	30	20	4	1	2	6

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Learning Objectives: After studying this paper the students will know –

1. Concept & Causes, effects, control and prevention of crime.
2. Scope of criminology and criminal behavior.
3. History and development of police administration.
4. Report writing and crime scene Management.

Unit 1: Crime
Definition, concept and scope of crime. Types of crime. Causes, effects, control and prevention of crime. Recent developments.

Unit 2: Criminology and criminal anthropology
Aim and scope of criminology; Criminal behavior and theories of criminal behavior: classic, positivist, sociological. Organized crimes, white collar crime. Juvenile delinquency. Role of correctional institutions. Criminal profiling and modus operandi, portrait parley, voice stress analysis. Victimology.

Unit 3: Criminal Law
Indian Penal Code: sections-23, 24, 25,39,44,52,76-79,84-86.
Criminal Procedure Code: sections-2, 6-35, 41-60, 61-90,154-176, 293, 294.

Unit 4: Criminal Law & Charges
Charges: bailable/non-bailable offences, cognizable/ non-cognizable, summon case and warrant cases. Indian Evidence Act: sections- 3, 24-30, 45, 135-138, 141. Expert testimony.
NDPS Act, Food and Adulteration Act, Drugs and Cosmetic Act, Arms Act, Explosives Act.

Unit 5: Police Administration
History and development of police administration; Police duties, responsibilities and powers. Organization and structure of police station; maintenance of crime records and accountability of police to law. People and society. Custodial deaths, Police and Human Rights.

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Suggested Readings

1. Swansan, C.R, Terrbles, L & Taylor,R.W; Police Administration, Prentice Hall, USA, 1998.
2. Gross.H; Criminal Investigation- A Practical Textbook for Magistrates, Police Officers, and Lawyers; Universal Law Publishing Co., New Delhi, 2000.
3. Lyman, M.D; Criminal Investigation – The Art & the Science, Prentice Hall, New Jersey, 2002.
4. O'Hara CE & Osterburg, JW; An Introduction to Criminalistics., Indiana University. Press, London, 1972.
5. Swansson,C.R, Chamelin, N.C, & Territ, L; Criminal Investigator, McGrawhill, New York, 2000.
6. The Indian Evidence Act,(1872), Amendment Act (2002); Universal Law Publishing Co., 2003.
7. The Code of Criminal Procedure (1973) Amendment Act, (2001); Universal Law Publishing Co., 2002.
8. Rattan Lal & Dhiraj Lal; The Indian Penal Code, 28th Ed. Wadhwa & Co. Nagpur, 2002.

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Subject Code	Category	Subject Name	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	Credits
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
MSCFS – 105 (1)	DC	Essential of Forensic Biology	60	20	20	00	00	3	1	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Learning Objectives

1. The importance of different biological organism in forensic science.
2. Their significant in solving crime where they found as evence.
3. That how this plant and vertebrate and invertebrates are illigallt traded.
4. The collection and preservation of this plant and animal evidences.

Unit 1: Protists, Fungi and Plants in Forensic Science

Introduction, Protists as forensic indicators, Fungi as forensic indicators,Plants as forensic indicators, Wood, Pollen and spores,Fruit, seeds and leaves, Plant secondary metabolites as sources of drugs and poisons, Illegal trade in protected plant species.

Unit 2: Invertebrates in Forensic Science

Introduction, Invertebrates as forensic indicators in cases of murder or suspicious death, Invertebrates attracted to dead bodies, Detritivores, Carnivores,Parasitoid insects, Coprophiles. Invertebrates leaving dead bodies, Invertebrates accidentally associated with dead bodies, Invertebrates as a cause of death, Invertebrates as forensic indicators in cases of neglect and animal welfare, The role of invertebrates in food spoilage and hygiene litigation, Invertebrates as a cause of nuisance, Invertebrates as a cause of structural damage, Illegal trade in protected species of invertebrates.

Unit 3: Vertebrates in Forensic Science

Introduction, Vertebrate scavenging of human corpses, Vertebrates causing death and injury, Neglect and abuse of vertebrates, Vertebrates and drugs, Vertebrates and food hygiene, Illegal trade in protected species of vertebrates.

Unit 4: Collection of Animal and Plant Material for Forensic Studies I

Introduction, The importance of scientific rigour and safety issues when collecting biological material, Collecting and preserving diatoms and algae for forensic analysis,

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Unit 5: Collection of Animal and Plant Material for Forensic Studies II

Collecting and preserving testate amoebae for forensic analysis,Collecting and preserving plant material for forensic analysis, Collecting invertebrates for forensic analysis.

Reference book

1. Stryer, Biochemistry, 3rd Edition, W.H. Freeman and Company, New York (1988).
2. R.K. Murray, D.K. Granner, P.A. Mayes and V.W. Rodwell, Harper's Biochemistry,
3. APPLETON & Lange, Norwalk (1993).
4. S. Chowdhuri, Forensic Biology, BPRD, New Delhi (1971).
5. R. Saferstein, Forensic Science Handbook, Vol. III, Prentice Hall, New Jersey (1993).
6. G.T. Duncan and M.I. Tracey, Serology and DNA typing in, Introduction to Forensic
7. Sciences, 2nd Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).
8. Essensial of forensic biology Alan GUNN .

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			THEORY			PRACTICAL		L	T	P	Credits
			End Sem University Exam	Two Term Exam	Teachers Assessment*	End Sem University Exam	Teachers Assessment*				
MSCFS–105 (2)	DC	Quality management & Research methodology	60	20	20	00	00	3	1	0	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Learning Objectives: After studying this paper the students will know –

1. Quality management System.
2. How to select Research Problem, To prepare research proposals and report writing.
3. Basics of statistics: Mean, Mode, Median, Standard deviation, correlation and regression analysis.

Unit 1: Quality Management System

Quality Management System: Quality, Total Quality, Quality assurance, Quality Control, Quality Planning, and Quality Audit: Internal and External Audit, Accreditation, NABL, ISO, IEC, BIS.

Unit 2 :Management Requirements

General Requirements for the competence of testing and calibration of laboratories, Management Requirements: organizational, document control, Subcontracting of tests and calibrations, Control of non conforming testing/ calibration work, Corrective and preventive actions, management review. Technical Requirements: Test and calibration methods and their validation, measurements, standards and reference material, traceability, sampling.

Unit 3: Selection of Research Problem

Selection of Research Problem: Research proposal, literature search, hypothesis, report writing. Sampling population and Sample, Sampling procedures (random and non random), sampling statistics, sampling and physical state, homogenization of samples, sample size and hazards in sampling.

Unit 4: Types of data

Types of data, Basic concepts of frequency distributions, measure of central Tendency, Mean, Median and Mode, measure of dispersion, range, mean deviation and standard deviation. Correlation and regression analysis.

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Unit 5: Significance of statistics in Forensic Science.

Variance – coefficient of variation, moment, Skewness, and kurtosis, binomial distribution, normal distribution, hyper geometric distribution, correlated measurements. Test of significant of attributes , Z-test of significance and coefficient of correlation , small sample test , t-test , paired test , chisquare test, F-test for equality variance , large sample test, Normal test . Significance of statistics in Forensic Science.

Reference books:

1. Aitken and D.A Stoney; The use of statistics in Forensic Science, Ellis Horwood Limited, England 1991.
2. Visweswara Rao. K: Biostatistics, A Manual of Statistical Methods for Use in Health, Nutrition & Anthropology.
3. Sokal, R.R & Rolf, F.J: Biometery, Principles & Practices of Statistics in Biological Research 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16. 17. 18. Rao, C. R Advanced Statistical Methods in Biometric Research.
4. Saferstein R. Forensic Science Handbook I, II, III.
5. William L. Duncan: Total Quality, Key Terms and Concepts.
6. Murray S. Cooper: Quality control in the Pharmaceutical Industry.
7. John T. Rabbitt, Peter A Bergh: The ISO 9000 Book.
8. Willard Merritt, Dean & Settle: Instrumental Methods of Analysis.
9. NABL -113
10. NABL -113A