SHRI VAISHNAV VIDHYAPEETH VISHVAVIDHYALAYA, INDORE

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

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

Course Code	Course 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 *				
BSFS–301	**Technological Methods in Forensic Science**	60	20	20	30	20	3	1	2	5

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. The importance of chromatographic and spectroscopic techniques in processing crime scene evidence.
2. The utility of Colorimetry, electrophoresis and neutron activation analysis in identifying chemical and biological materials.
3. The significance of microscopy in visualizing trace evidence and comparing it with control samples.
4. The usefulness of photography and videography for recording the crime scenes.

Unit 1: Chromatographic Techniques:
Sample preparation for chromatographic and Chromatographic methods. Fundamental principles and forensic applications of thin layer chromatography, gas chromatography and liquid chromatography.

Unit 2: Spectroscopic methods:
Fundamental principles and forensic applications of Colorimetry, Ultraviolet visible spectroscopy, infrared spectroscopy, atomic absorption spectroscopy, atomic emission spectroscopy and mass spectroscopy.

Unit 3 Electrophoresis and NAA:
Fundamental principles, types, instrumentation and forensic applications of Electrophoresis. Neutron Activation Analysis – fundamental principles and forensic applications.

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Unit 4: Microscopy

Fundamental principles , Different types of microscopes. Electron microscope. Comparison Microscope. Stereomicroscope, Forensic applications of microscopy.

Unit 5: Forensic photography

Basic principles and applications of photography in forensic science. Infrared and ultraviolet photography. Digital photography. Videography, Crime scene and laboratory photography.

List of Practicals

1. To determine the concentration of a colored compound by colorimetry 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.
5. To take photographs using different filters.
6. To take photographs of crime scene exhibits at different angles.
7. To record videography of a crime scene.

Suggested Readings

1. D.A. Skoog, D.M. West and F.J. Holler, Fundamentals of Analytical Chemistry, 6 th Edition, Saunders College Publishing, Fort Worth (1992).
2. W. Kemp, Organic Spectroscopy, 3rd Edition, Macmillan, Hampshire (1991).
3. J.W. Robinson, Undergraduate Instrumental Analysis, 5th Edition, Marcel Dekker, Inc., New York (1995).
4. D.R. Redsicker, The Practical Methodology of Forensic Photography, 2nd Edition, CRC Press, Boca Raton (2000).
5. R.E. Jacobson, S.F. Ray, G.G. Attridge; The Manual of Photography- Photographic and Digital Imaging, N.R. Oxford.

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

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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 *				
BSFS302	**Forensic Dermatoglyphics**	60	20	20	30	20	3	1	2	5

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Learning Objectives: After studying this Paper the Students will Know-

1. The historical development of fingerprint
2. The basic patterns and types of fingerprints
3. The different developing methods of fingerprint.
4. The classification, identification and comparison of fingerprint.

Unit 1: Basics of Fingerprinting

Introduction and history, with special reference to India. Biological basis of fingerprints. Formation of ridges. Fundamental principles of fingerprinting.

Unit 2: Fingerprint characteristics/minutiae.

Types of fingerprints. Fingerprint patterns. characteristics/minutiae of Fingerprint, Plain and rolled fingerprints. Classification and cataloguing of fingerprint record. Automated fingerprint Identification System. Significance of poroscopy and edgeoscopy.

Unit 3: Development of Fingerprints

Constituents of sweat residue. Latent prints. Latent fingerprints' detection by physical and chemical techniques. Mechanism of detection of fingerprints by different developing reagents.

Unit 4: Preservation of developed fingerprints.

Application of light sources in fingerprint detection. Preservation of developed fingerprints. Digital imaging for fingerprint enhancement. Fingerprinting the deceased. Developing fingerprints on gloves.

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Unit 5: Other Impressions

Importance of footprints. Casting of foot prints, Electrostatic lifting of latent foot prints. Palm prints. Lip prints - Nature, location, collection and examination of lip prints. Ear prints and their significance. Palm prints and their historical importance.

List of Practicals

1. To record plain and rolled fingerprints.
2. To carry out ten digit classification of fingerprints.
3. To identify different fingerprint patterns.
4. To identify core and delta.
5. To carry out ridge tracing and ridge counting.
6. To investigate physical methods of fingerprint detection.
7. To investigate chemical methods of fingerprint detection.
8. To use different light sources for enhancing developed fingerprints.
9. To prepare cast of foot prints.
10. To investigate Fuming methods of fingerprint detection.

Suggested Readings:

1. J.E. Cowger, Friction Ridge Skin, CRC Press, Boca Raton (1983).
2. D.A. Ashbaugh, Quantitative-Qualitative Friction Ridge Analysis, CRC Press, Boca Raton (2000).
3. C. Champod, C. Lennard, P. Margot an M. Stoilovic, Fingerprints and other Ridge Skin Impressions, CRC Press, Boca Raton (2004).
4. Lee and Gaensleen's, Advances in Fingerprint Technology, 3rd Edition, R.S. Ramotowski (Ed.), CRC Press, Boca Raton (2013).

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

Course Code	Course 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 *				
BSFS 303	Criminalistics	60	20	20	30	20	3	1	2	5

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. The methods of securing, searching and documenting crime scenes.
2. The art of collecting, packaging and preserving different types of physical and trace evidence at crime scenes.
3. The legal importance of chain of custody.
4. The tools and techniques for analysis of different types of crime scene evidence.

Unit 1: Crime Scene Management
Scene of Crime- Indoor, Outdoor and Mobile, Securing and Isolating the crime scene. Crime scene search methods. Safety measures at crime scenes. Legal considerations at crime scenes. Documentation of crime scenes – photography, videography, sketching and recording notes. Duties of first responders at crime scenes. Coordination between police personnel and forensic scientists at crime scenes. The evaluation of 5Ws (who?, what?, when?, where?, why?) and 1H (how?). Crime scene logs.

Unit 2: Crime Scene Evidence:- Classification of crime scene evidence – physical and trace evidence. Locard exchange principle. Collection, labelling, sealing of evidence. Hazardous evidence. Preservation of evidence. Chain of custody. Reconstruction of crime scene.

Unit 3: Glass evidence
Collection, packaging, analysis. Matching of glass samples by mechanical fit and refractive index measurements. Analysis by spectroscopic methods. Fracture analysis and direction of impact.
Paint evidence – collection, packaging and preservation. Analysis by destructive and nondestructive methods. Importance of paint evidence in hit and run cases.

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Unit 4: Fibre evidence

Artificial and man-made fibres. Collection of fibre evidence. Identification and comparison of fibres. Soil evidence – importance, location, collection and comparison of soil samples.

Cloth evidence – importance, collection, analysis of adhering material. Matching of pieces.

Unit : 5 Tool mark evidence:- Classification of tool marks. Forensic importance of toolmarks. Collection, preservation and matching of toolmarks. Restoration of erased serial numbers and engraved marks.

Practicals

1. To prepare a report on evaluation of crime scene.
2. Basics of sketching of crime scene.
3. To carry out sketching of crime scene (indoors and out door).
4. To reconstruct crime scene. (indoor and outdoor)
5. To compare soil samples by density gradient method.
6. To compare paint samples by physical matching method.
7. To compare paint samples by thin layer chromatography method.
8. To compare glass samples by refractive index method.
9. To identify and compare tool marks.
10. To compare cloth samples by physical matching

Suggested Readings:

1. M. Byrd, Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence, CRC Press, Boca Raton (2001).
2. T.J. Gardener and T.M. Anderson, Criminal Evidence, 4th Ed., Wadsworth, Belmont (2001).
3. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific and Investigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005).
4. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013).
5. Saferstein: Criminalistics – An Introduction to Forensic Science, Prentice hall Inc. USA 91995).
6. O' Hara &Osterberg : An Introduction to Criminalistics.
7. Sharma B R: Forensic Science in Criminal Investigation and trials.

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

Course Code	Course 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 *				
BSFS304	**Computer Science**	60	20	20	30	20	3	1	2	5

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. The basics of computer hardware and their functions,
2. The basics of networking.
3. The network security.
4. The importance of computer language in forensics.
5. The importance of digital evidence in cyber forensic investigation.

Unit-1 Basic of Computers

Fundamentals of computers, hardware and accessories. Types of Memory – Primary Memory-: RAM, SRAM, DRAM, ROM, EPROM, Secondary Memory-: Magnetic, Floppy, Hard Disk RAM, ROM; Optical Memory-: CDROM, WORM; Concept of Virtual Memory, Concept of Cache, Memory hierarchy.

Unit-2 Networking & File System

Connecting Devices-: Routers, Hubs, Bridges,Basics of Networking – Types of topologies, LAN, MAN, WAN etc.File system management FAT, NTFS etc. Logic Gates: AND, OR, NOT, NOR, NAND, EX-OR, EX-NOR Operations and their Truth Tables.

Unit-3 Basic Internet

Introduction to Internet , World Wide Web, E-mails, Chat, Search Engines, types of portals, Networking Protocols-TCP/IP Protocol, FTP, SMTP, HTTP, SSC, POP etc. Network Security – Threats, Vulnerabilities, Access control, DOS attack, Virus, Trojans, cloud based application.

Unit-4 Operating System and 'C' Programming

Introduction to operating System, process management, concurrency, scheduling, synchronization, Introduction to C programming -: Introduction, Data Types and Variables, Simple Program Structure, Simple Input and Output, Simple and Compound Conditions (Branching), Looping (For, While, Do..While).

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Unit-5 Cyber Crime

What is Cyber Crime; Cyber Forensic and Digital Evidence, Conventional crime VS cybercrime, Nature of digital evidence, Precautions while dealing with digital evidence.types of cybercrimes, Digital Evidence, Digital Vs. Physical Evidence.

Practicals

1. Working of Networking Devices
2. Windows – Installation
3. Windows - Basic commands
4. Windows - Network Configuration
5. Finding results of different logic gates & their combinations
6. Tracing and analyzing E – mail senders IP Address of received e–mail
7. C Programming for Basic program
8. C programming for Variable
9. C programming for Loop
10. C programming for Mathematical Operations

Suggested Readings:

1. Computer Organization and Architecture Designing for Performance, Eight Edition, William Stallings, Pearson Publication.
2. Computer System Architecture, M. MorrisMano, PHI Publications
3. Operating System Concepts, Silberschatz, Galvin, Gagne, John Wiley and Sons Publications.
4. Introduction to Algorithms, Cormen, Leiserson, Rivest, Stein.
5. Introduction to C :Kanetkar.
6. Digital Evidence and Computer Crime, 2nd ed. :Eoghan Casey Computer Forensics: Principles and Practices : Linda Volonino, Reynaldo.

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

Course Code	Course 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 *				
BSFS 3051	**Handwriting Identification & Recognition**	60	20	20	00	00	3	1	0	4

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

1. The importance of examining questioned documents in crime cases.
2. The tools required for examination of questioned documents.
3. The significance of comparing hand writing samples.
4. The importance of detecting frauds and forgeries by analyzing questioned documents.

Unit 1: Handwriting

Definition of handwriting, Characteristics of handwriting- Arrangement, alignment, margin, slant, speed, pressure, spacing, line quality, embellishments, movement and pen lifts. Application of handwriting in personal Identification. Factors influencing handwriting-physical, mechanical, genetic and physiological factors.

Unit 2- Neuromuscular Basis of Handwriting:

Human Nervous System, Broadmann's area, Brain Function for Hand Motor Control, Neuroanatomical Bases of Hand Motor Control, Frontal-Subcortical Neural Circuits and Motor Function, The Cerebellum and Brain Stem. Handwriting as a Motor Program, Hierarchical Models of Handwriting Motor Control.

Unit 3: Identification of Handwriting

Basis of handwriting identification. Development of individuality in handwriting. Natural variations and fundamental divergences in handwritings. Class and individual characteristics.

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Unit 4: Comparison of Handwriting

Basis of handwriting comparison , Collection of handwriting samples. Exempler, Merits and demerits of exemplar and non-exemplar samples during comparison of handwriting. Standards for comparison of handwriting. Forgery detection. Counterfeiting. Tools used in handwriting examination.

Unit 5: Handwriting Examination and Recognition

Basis of handwriting recognition.Off-line and on-line handwriting recognition. Steps involved in handwriting recognition – pre-processing, feature extraction and classification. Applications of handwriting recognition.

Suggested Readings

1. O. Hilton, Scientific Examination of Questioned Documents, CRC Press, Boca Raton (1982).
2. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4th Edition, Foundation Press, New York (1995).
3. R.N. Morris, Forensic Handwriting Identification: Fundamental Concepts and Principles, Academic Press, London (2000).

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Course Code	Course 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 *				
BSFS3052	**Forensic Science & Society**	60	20	20	00	00	3	1	0	4

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Learning Objectives: After studying this paper the students will know

1. Role of Engineers in Forensic Science.
2. Methods of digging the burial site and preservation of remains
3. History and Integration of Forensic Anthropology

Unit 1: Forensic Engineering
Role of mechanical, electronics and computer engineers in forensic science. Accident investigations. Failure of signaling and control systems. Ergonomics. Applications of animations, simulations and digital imaging in solving crime cases. Episodes involving fire engineering.

Unit 2: Forensic Archaeology
Role of forensic archaeology. Searching the archaeological site. Methods of digging the burial site. Recovery of remains. Documenting the recovered material. Preservation of remains.

Unit 3: Forensic Anthropology
The History and Integration of Forensic Anthropology, The Concept of Race , Identification of bones, Ancestry Estimation , Sex Estimation, Facial Reconstruction, DNA.

Unit 4: Forensic Linguistic
History, Definition and disciplines of Forensic linguistics, types of Forensic text, History of Computational Linguistics, Investigative Linguistics – phonetic analysis, ransom demand and other threat communication, forensic stylistics.

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Unit 5: Nuclear Forensic

Definition, nuclear and other radioactive material, illicit trafficking of nuclear and other radioactive material, nuclear attribution, collection of radioactive evidence, nuclear forensics laboratory, elemental analysis tools and techniques.

Suggested Readings:

1. J.F. Brown and K.S. Obenski, Forensic Engineering – Reconstruction of Accidents C.C. Thomas, Springfield (1990).
2. E.W. Killam, The Detection of Human Remains, C.C. Thomas, Springfield (1990).
3. R.K. Noon, Introduction to Forensic Engineering, CRC Press, Boca Raton (1992).
4. O. Ribaux and P. Margot in Encyclopedia of Forensic Sciences, Volume 1, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Ed.), Academic Press, London (2000)
5. 3. O' Hara &Osterberg : An Introduction to Criminalistics.
6. 4. Lee, Honry : Advances in Forensic Science.
7. 6. Mordby, J Deed Reckoning – The Art of For Forensic Science Detection, CRC Press LLC, Boca Raton FL, CRC Press (2000
8. J A Siegel, P.J Saukko (2000) Encyclopedia of Forensic Sciences Vol. I, II and III, Acad. Press

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