

Medi-Caps Univer. **INDORE (M. P.)**
B. Sc Forensic Science(Hons.) Credit Point details (2023-26)
3 Year Degree Programme

Semester- I

S.No.	Subject Code	Course Description	Name of Papers	L	T	P	Credit
1	FS3CO01	Core (CO)	Introduction to Forensic Science	2	0	2	3
2	FS3CO17	Core (CO)	Elements of Criminology & police	3	0	2	4
3	FS3CO03	Core (CO)	Human Anatomy	4	0	2	5
4	FS3EL01	Elective Discipline	Forensic Physics	2	0	2	3
5	FS3EG01	Elective Generic	Computer Science	3	0	2	4
6	FS3AE01	Ability	English Communication	2	0	2	3
			Total	16	0	12	22
			Total Contact Hours	28			

Semester- II

S.No.	Subject Code	Course Description	Name of Papers	L	T	P	Credit
1	FS3CO16	Core (CO)	Forensic Psychology	3	0	2	4
2	FS3CO18	Core (CO)	Criminal Law	3	0	2	4
3	FS3EL11	Elective Discipline	Human Physiology	3	0	2	4
4	FS3EG05	Elective Generic	Zoology	3	0	2	4
5	FS3AE03	Ability	Environmental Studies	2	0	0	2
6	FS3SE05	Skill Enhancement	Cyber Security	3	0	2	4
7	FS3NG01	Non-Gradual (NG)	Soft Skill-1	2	0	0	2
			Total	19	0	10	24
			Total Contact Hours	29			

Semester- III

S.No	Subject Code	Course Description	Name of Papers	L	T	P	Credit
1	FS3CO06	Core (CO)	Technological Methods in Forensic	3	0	2	4
2	FS3CO19	Core (CO)	Forensic Dermatology	3	0	2	4
3	FS3CO20	Core (CO)	Advancement in Forensic Science	3	0	2	4
4	FS3EL03	Elective Discipline	Criminalists	3	0	2	4
5	FS3EG03	Elective Generic	Entomology	2	0	2	3
6	FS3SE06	Skill Enhancement	Digital Biometric	2	0	2	3
7	FS3NG02	Non-Gradual (NG)	Soft Skill-2	2	0	0	2
			Total	18	0	12	24
			Total Contact Hours	30			

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Semester- IV

S.No.	Subject Code	Course Description	Name of Papers	L	T	P	Credit
1	FS3CO09	Core (CO)	Forensic Chemistry	3	0	2	4
2	FS3CO10	Core (CO)	Questioned Document	3	0	2	4
3	FS3CO21	Core (CO)	Forensic Biology	3	0	2	4
4	FS3EL04	Elective Discipline	Digital & Cyber Forensic science	3	0	2	4
5	FS3EG06*	Elective Generic	Chemistry	3	0	2	4
6	FS3SE03	Skill Enhancement	Scientific Investigation	2	0	2	3
			Total	17	0	12	23
			Total Contact Hours	29			

Semester- V

S.No.	Subject Code	Course Description	Name of Papers	L	T	P	Credit
1	FS3CO22	Core (CO)	Forensic Ballistics	3	0	2	4
2	FS3CO23	Core (CO)	Forensic Toxicology	3	0	2	4
3	FS3EL05*	Elective Discipline	Genetics	3	0	2	4
3	FS3EL06*	Elective Discipline	DNA Typing	3	0	2	4
4	FS3EL07	Elective Discipline	Forensic Serology	3	0	2	4
6	FS3SE08*	Skill Enhancement	Digital & Fraud Investigation	2	0	2	3
	FS3NG03	Non-Gradual (NG)	Soft Skill-3	2	0	0	2
			Total	19	0	10	21
			Total Contact Hours	29			

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Semester- VI

S.No.	Subject Code	Course Description	Name of Papers	L	T	P	Credit
1	FS3CO24	Core (CO)	Forensic Anthropology	3	0	2	4
2	FS3CO25	Core (CO)	Forensic medicines	3	0	2	4
3	FS3CO26	Elective Discipline	Advance Instrumentation	3	0	2	4
4	FS3EL09*	Elective Discipline	Forensic Statistics	2	0	2	3
5	FS3EL11*	Elective Discipline	Mobile Forensic	2	0	2	3
6	FS3SE04	Skill Enhancement	Project work	0	0	6	3
			Total	11	0	14	18
			Total Contact Hours				25

Total Credit Semester Wise	
Semester- I	22
Semester- II	24
Semester- III	24
Semester- IV	23
Semester- V	21
Semester- VI	18
Total	132

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 Dr. Baljeet Yadav,
 HOD, FS.

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 Dr. A.A. Koser,
 Dean Science.

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 22/8/2024



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Syllabus

SEM-III

Paper-I

Course Code	Courses	Hours Per week			Total	
		L	T	P	Hrs	Credit
FS3CO06	Technological Methods in Forensic Science	3	-	2	5	4

Course objective

After studying this course, the students shall be able to

1. Evaluate the physical evidence based on the principles of chromatography and its types.
2. Examine complex mixtures by applying scientific methods of spectroscopy in the field of Forensic science.
3. Identify the different instruments and their principles such as Raman spectroscopy FTIR, to separate mixtures by different centrifugation methods
4. Identify the role of instrumental techniques such as microscopy used within the criminal justice system.
5. Perform the scientific processes by knowledge of centrifugation techniques.

Prerequisites: Instrumental analysis (I SEM)

Co-requisites: Nil

Unit I

Chromatographic Techniques

Introduction and principles of chromatography, its classification. Sample preparation techniques for chromatographic methods. Other chromatographic methods. Fundamental principles and Forensic applications of Thin Layer Chromatography, Gas chromatography and Liquid chromatography. Theoretical principles, instrumentation and technique, columns, stationary phases, detectors, Forensic applications. HPLC, its theory, Instrumentation, column, detectors and forensic applications.

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Unit II

UV-Vis spectroscopy & AAS Spectroscopy

Ultraviolet and visible spectroscopy- colorimetric analysis and Lambert-Beer law principle working, instrumentation and its Forensic Application, Atomic Absorption Spectroscopy (AAS); Principle, Components, Sample handling, Instrumentation and its Forensic Application.

Unit III

IR Spectroscopy and Raman Spectroscopy

Infrared spectroscopy- Basic principle, IR Spectra components, sample handling, FTIR, qualitative analysis and data interpretation and correlation of IR spectra, with molecular structure and application in Forensic science, Raman spectroscopy- Basic principle, instrumentation, application in Forensic Chemistry and Toxicology.

Unit IV

Microscopy Techniques

Different types of microscopes. Simple compound. Stereo Microscope, Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM), Confocal Microscope, Automated Fluorescence Microscope, Polarizing Microscope, Comparison Microscope and Forensic applications of microscopy.

Unit V

Centrifugation Techniques

Basic principles of sedimentation, various types of centrifuges, Density gradient centrifugation, Preparative centrifugation, Analysis of sub- cellular fractions, Ultra- centrifuge- Refrigerated Centrifuge.

Case Studies: Optional

Project: Optional.

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List of Practical:

1. To determine the concentration of a coloured 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 study the principal and working of Electrophoresis
6. To extract the DNA supernatant by centrifugation Technique
7. To observe any coloured compound using Colorimeter
8. Analysis of dye by TLC and UV- visible.
9. Extraction of DNA from blood or saliva by centrifugation technique.
10. Analysis of DNA from saliva or blood by Electrophoresis technique.

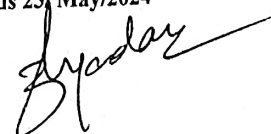
Course outcomes:

After studying the course, the student will be able

1. To remember the basic concepts and application of chromatographic methods in examination of forensic samples.
2. To understand the basic principles of molecular spectroscopy in samples investigation.
3. To apply the basic principles and theory of spectroscopic techniques and other Physical instrumentation techniques for analytical purposes.
4. To analyse general principles and working methodology of centrifugation techniques for isolation and extraction of biological and chemical exhibits.
5. To evaluate application of different microscopes for preliminary screening of various samples.

Text books

1. Vacca, J. R; Computer Forensic, Firewall Media Pub. New Delhi,
2. Rose, P; Forensic Speaker Identification, Taylor & Francis, Forensic Science Series, London,
3. Sharma, B.R., Forensic Science in Criminal Investigation & Trials, Universal Publishing Co., New Delhi,





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Syllabus

Paper-II

Course Code	Courses	Hours Per week			Total	
		L	T	P	Hrs	Credit
FS3CO19	Forensic Dermatoglyphics	3	-	2	5	4

Course objectives:

After studying this course, the students shall be able to

1. Understand the historical development, biological basis, and fundamental principles of fingerprints.
2. Identify and describe the various types of fingerprint patterns, and to perform ridge counting and tracing.
3. Understand and apply Henry's System of Classification, including its extensions, and learn about automated systems for fingerprint classification.
4. develop latent fingerprints using various physical and chemical techniques.
5. Understand the importance of palm prints and analyse main patterns and flexions in palm print areas.

Prerequisites: 12th

Co-requisites: Nil

Unit I

Basics of Fingerprints

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

Unit II

Types of fingerprints.

Types of Fingerprints, Pattern area, Type line, Core, Delta, Types of fingerprint patterns. Fingerprint characteristics/minutiae. Plain and rolled fingerprints. Ridge counting and Ridge tracing.

Unit III

Classification of Fingerprints

Henry's System of Classification: Primary, Secondary, Sub-Secondary, Key, Major, Final. Extension of Henry system, Battley Single digit Classification, Automated Fingerprint Identification System.

Unit IV

Development of Fingerprints

Constituents of sweat residue. Latent fingerprints' detection by physical and chemical techniques. Application of light sources in fingerprint detection. Preservation of developed fingerprints. Digital imaging for fingerprint enhancement. Fingerprinting the deceased.

Unit V

Palm Prints

Palm prints and its Importance, Types of Palm Prints, Classification of Palm Print (Interdigital Region, Thenar, Hypothenar) Main Patterns and Flexions of Palmprint Area, Types of Palm Prints Patterns and Ridge Characteristics.

Case Studies: Optional

Project: Optional.

List of Practical

1. To record plain and rolled fingerprints.
2. To identify different fingerprint patterns.
3. To identify core and delta.
4. To carry out ten-digit classification of fingerprints.
5. To identify different ridge characteristics.
6. To perform ridge tracing and ridge counting.
7. To perform Photography of different types of fingerprints.

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8. To develop and lift Latent fingerprints with Powder method.
9. To develop Latent fingerprint with iodine fuming method.
10. To develop Latent fingerprints with chemical methods.
11. To study palm print characteristics.

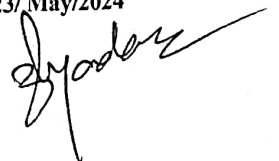
Course Outcomes

After completion of course, student of will be able

1. To explain the history, biological basis, and fundamental principles of fingerprints.
2. To identify the types of fingerprint patterns and its ridge characteristics.
3. To apply Henry's System of Classification and extensions in organizing and identifying fingerprints.
4. To demonstrate the development and enhancement of latent fingerprints using physical and chemical techniques.
5. To analyse the different types of palm prints, including the main patterns and ridge characteristics in the interdigital, thenar, and hypothenar regions.

Text Books

1. Champod, C., & Vuille, J. (2016). Fingerprints and Other Ridge Skin Impressions (2nd ed.). CRC Press.
2. Saferstein, R. (2020). Criminalistics: An Introduction to Forensic Science (13th ed.). Pearson.
3. Holder, E. H., Robinson, L. O., & Laub, J. H. (2011). The Fingerprint Sourcebook. National Institute of Justice.
4. Saks, M. J., & Koehler, J. J. (2019). The Psychological Science of Evidence Law. NYU Press.
5. Jain, A. K., & Maltoni, D. (2020). Handbook of Fingerprint Recognition (2nd ed.). Springer.
6. Champod, C., Lennard, C., & Margot, P. (2016). Fingerprints and Other Ridge Skin Impressions. CRC Press.
7. Ramotowski, R. (Ed.). (2013). Lee and Gaensslen's Advances in Fingerprint Technology (3rd ed.). CRC Press.
8. Huber, R. A., & Headrick, A. M. (1999). Handwriting Identification: Facts and Fundamentals. CRC Press.
9. Wilkinson, C., & Rynn, C. (2012). Forensic Facial Reconstruction. Cambridge University Press.
10. Champod, C., Lennard, C., Margot, P., & Stoilovic, M. (2017). Fingerprints and Other Ridge Skin Impressions (3rd ed.). CRC Press.



Suggested Reading

1. Maltoni, D., Maio, D., Jain, A. K., & Prabhakar, S. (2009). Handbook of Fingerprint Recognition (2nd ed.). Springer.
2. James, S. H., & Nordby, J. J. (2009). Forensic Science: An Introduction to Scientific and Investigative Techniques (3rd ed.). CRC Press.
3. Lee, H. C., & Gaensslen, R. E. (2001). Advances in Fingerprint Technology (2nd ed.). CRC Press.
4. Tiwari, V., & Jain, S. (2015). Automated Fingerprint Recognition System: An Efficient Approach for Forensic Analysis. International Journal of Computer Science and Mobile Computing.
5. Trotter, T. L., & Langley, K. R. (2008). Latent Print Development: Historical, Legal, and Technical Considerations. Forensic Science Review, 20(2), 111-146.

Web Source:

<http://www.santoshraut.com/>

<https://www.elsevier.com>

<https://www.nij.gov/>

<https://study.com>

Open Learning Source:

<https://swayam.gov.in/courses/public>





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Syllabus

III Sem

Paper-IV

Course Code	Course Name	Hours Per week			Total	
		L	T	P	Hrs	Credit
FS3EL03	Criminalistics	3	-	2	5	4

Course objectives:

After studying this paper, the students will know

1. The basic understanding of crime and criminalistics.
2. The documentation techniques used in crime scenes.
3. Different types of crime scene evidence and their classification.
4. Knowledge and skills in the collection and preservation of evidence and the importance of maintaining the chain of custody.
5. About the concept and techniques of crime scene reconstruction.

Prerequisites: 12th

Co-requisites: Nil

Unit I

Introduction to Criminalistics

Definition and history of criminalistics, Role of a criminalist in crime investigation, Types of crime scenes, Protection of crime scene, Safety measures at crime scene, Crime scene search methods, legal consideration at crime scene.

Unit II

Documentation of crime scenes

Duties of first responders at crime scenes. Coordination between police personnel and forensic scientists at crime scenes. Crime scene logs and Recording notes. Sketching and its types, Methods

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of sketching, Photography and its types, Videography. The evaluation of 5Ws (who? what? when? where? why?) and 1H (how?).

Unit III

Crime Scene Evidence

Definition of Evidence, Classification of evidence, Types of crime scene evidence, Evidences to be collected in different types of crimes- Murder and assault cases, Poisoning cases, sexual assault cases, Burglary, dacoity and theft cases, Explosion and fire & arson cases, Cybercrimes, wildlife crimes, Accident cases etc.

Unit IV

Collection and Preservation

General safety considerations while handling evidence in the crime scene. Collection and Preservation of evidence along with control samples and standards sample: blood, saliva, semen, hair, soil, paint, glass, bullet, cartridge case, clothing, weapons (knife, firearm), documents, drugs, fingerprints, tool marks, explosive material, bite marks etc. Management of Hazardous evidence. labelling, sealing, forwarding evidence to the Forensic Science Laboratory. Chain of custody.

Unit V

Crime scene Reconstruction

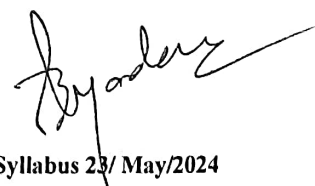
Introduction to Crime Scene Reconstruction, Nature of Reconstruction, Basic Principles for Reconstruction (Recognition, Identification, Individualization and Reconstruction), Stages in Reconstruction, Types of Reconstruction, Pattern Evidence (Bloodstain Pattern, Glass Fracture Patterns, Fire Burn Patterns, Tire and Skid Mark Patterns)

Case study: Applicable

Project: Optional

List of practical:

1. Securing and evaluating indoor and outdoor scenes of crime.
2. Searching indoor scenes of crime using spiral technique and listing evidence.
3. Searching outdoor scenes of crime using grid search techniques.
4. Photographing scenes of crime with at least five pieces of evidence.
5. Sketching of indoor crime scenes using the baseline method.



6. Sketching of outdoor crime scenes using triangulation methods.
7. Making contemporaneous notes while investigating a scene of crime.
8. Collection, preservation, sealing and forwarding of soil samples from crime scenes.
9. Collection, preservation, sealing and forwarding of blood samples from crime scenes
10. Crime scene reconstruction of a simulated scene of murder/Arson.

Course outcomes:

After completion of the course. the student will be able

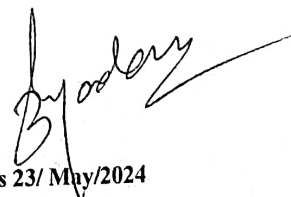
1. To explain key principles and roles in criminalistics, including crime scene types and safety measures
2. To use sketching, photography, and videography to document and evaluate crime scene
3. To classify different types of evidence collected from crime scenes.
4. To understand techniques for the safe collection, preservation, and management of evidence
5. To apply reconstruction principles to interpret and integrate crime scene pattern evidence

Text books:

1. S. H. James, J. J. Forensic science; "An introduction of Scientific and Investigative Technique", CRC Press, Boca Raton.
2. B. R. Sharma; "Forensic Science in criminal Investigation and Trails", Universal publication

Reference

1. DeForest PR, Gaensslen RE and Lee HC (1983) Forensic Science: An Introduction to criminalistics. New York: MacGraw-Hill.
2. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey
3. B. R. Sharma; "Forensic Science in criminal Investigation and Trails", 3rd ed. Central law Agency, Allahabad, India 1990.
4. Gross, H. and R.L. Jackson. Criminal Investigation, London, 1962
5. Fisher BAJ (1993) Technique of Crime Scene Investigation, 5th ed. Boca Raton FL: CRC Press.
6. John J Horgan. Criminal Investigation, 2nd ed. Mc Graw-Hill., New York, London, 1979
7. Tuthill H (1994) Individualization: Principles and Procedure in Criminalistics. Salem, OR: Lightning Powder Company.



Web Source:

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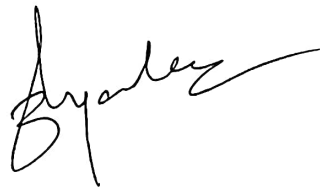
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<http://nptel.ac.in/course.php>





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Syllabus

SEM-III

Paper- IV

Course Code	Courses	Hours Per week			Total	
		L	T	P	Hrs	Credit
FS3SE06	Digital Biometric	2	-	2	4	3

Course Objectives:

1. To understand the basics of Biometrics and its functionalities
2. To learn the role of biometrics in the organization
3. To learn various image processing techniques.
4. To understand the concept of IRIS and sensors
5. To understand and learn the standard and privacy issues in biometric security.

Prerequisites: 12th

Co-requisites: Nil

Unit I

Introduction

Biometric fundamentals, Biometric technologies, Biometrics Vs traditional techniques, Characteristics of a good biometric system, Benefits of biometrics.

Physiological Biometrics: Leading technologies, Finger-scan, Facial-scan, Iris-scan, Voice-scan, components, working principles, competing technologies, strengths and weaknesses, Hand-scan, Retina-scan, components, working principles, competing technologies, strengths and weaknesses, Automated fingerprint identification systems

Unit II

Fingerprint Biometrics

Fingerprint Patterns, Fingerprint Features, Fingerprint Image, width between two ridges - Fingerprint Image Processing - Minutiae Determination - Fingerprint Matching: Fingerprint Classification, Matching policies.

Unit III

Fundamentals of Image Processing: Digital Image Representation

Fundamental steps in Image Processing Image Enhancement: The Spatial Domain Methods, The Frequency Domain Methods.

Image Segmentation: Pixel Classification by Thresholding, Histogram Techniques, Smoothing and Thresholding- Gradient Based Segmentation: Gradient Image, Boundary Tracking, Laplacian Edge Detection.

Unit IV

Iris Biometrics

Iris System Architecture, Definitions and Notations - Iris Recognition: Iris location, Doubly Dimensionless Projection, Iris code, Comparison - Coordinate System: Head Tilting Problem, Basic Eye Model, Texture Energy Feature.

Unit V

Behavioral Biometrics

Leading technologies: Signature-scan – Keystroke scan – components, working principles, strengths and weaknesses. Privacy and Standards in Biometrics: Assessing the Privacy Risks of Biometrics – Designing Privacy- Sympathetic Biometric Systems – Need for standards – different biometric standards.

List of practical:

1. To study the different parameter of gait pattern.
2. To determine the foot dynamics for given sample.
3. To study the different optical sensors using in biometric.
4. To identify the thumb print or finger print by using biometry.
5. To compare the given data sample of thumb print.
6. To determine different type of iris pattern.
7. To measure the blood pressure at different condition.
8. To find out the key strokes variation in the given samples.
9. To study the heart rate of a normal person and Stressed person.
10. To study natural variation in writing.

Course Outcomes

At the end of the course the student should be able to

1. To identify the various biometric technologies.



2. To Understand biometric technologies applicable in various organizations.
3. To Evaluate various Image processing methods.
4. Apply the concept of IRIS and Sensor technologies
5. Create privacy standards and identify issues in biometric security.

References

1. James wayman,Anilk.Jain ,Arun A.Ross ,Karthik Nandakumar, —Introduction to Biometricsl, Springer, 2011
2. John Vacca "Biometrics Technologies and Verification Systems" Elsevier 2007
3. James Wayman,AnilJain,DavidMAltoni,DasioMaio(Eds) "Biometrics Systems Technology",Design and Performance Evaluation.Springer 2005
4. Khalid saeed with Marcin Adamski, TapalinaBhattasali, Mohammed K. Nammous, Piotrpanasiuk, mariusz Rybnik and soharabH.Sgaikh, —New Directions in Behavioral Biometricsl, CRC Press 2017
5. Paul Reid "Biometrics For Network Security "Person Education 2004
6. Shimon K.Modi , —Biometrics in Identity Management :concepts to applicationsl, ArtechHouse 2011

