



**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**Integrated Master of Science (Biotechnology)**

**Semester: 5**

**Subject Name: Forensic Biotechnology**

**Subject Code: 1350405**

**Teaching and Examination Scheme:**

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE (E)	PA (M)	ESE (V)	PA (I)		
4	0	0	4	70	30	0	0	100

**Prerequisite:**

Students must be aware with molecular biology concepts. They should have brief knowledge of chemistry, cell biology and genetics

**Rationale:**

Forensic biotechnology is a vital instrument for the detection or investigation of crime and the administration of justice by providing crucial information about the evidence found at the crime scene. Forensic biotechnology is an area of medical science that experiences constant breakthrough every now and then. DNA forensics is now revolutionizing many aspects of criminal investigation which include DNA fingerprinting, DNA foot-printing, DNA pro-filing, etc. Polymerase chain reaction (PCR) analysis of DNA samples allows precise identifications to be made from very tiny bits of evidence collected at the crime scene.

**Course Content:**

Unit No.	Content	No. of Hours	Weightage (%)
1	<b>Introduction to Forensic Biotechnology</b> A brief knowledge of Forensic Biotechnology, Forensic Genetics, Forensic Agriculture Wildlife Forensics	7	12
2	<b>Forensic Characterization of Blood</b> Chemistry and properties, Presumptive and Confirmatory tests, Individualization (Blood Grouping, Polymorphic enzyme typing).	8	13
3	<b>Forensic Characterization of Semen</b> Formation, Composition, Morphology of spermatozoa, forensic significance, Presumptive and Confirmatory tests (including Azoospermic semen stains) Individualization (Blood Grouping, seminal fluid isozymes typing, forensic significance, Collection and analysis of evidences in Rape cases	15	25
4	<b>Forensic Serological Techniques</b> Primary binding assays (ELISA, Immuno chromatographic assays), Secondary Binding assays (Precipitation based assays- Immunodiffusion and electrophoretic methods for	15	25



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	species. Identification, Agglutination based assays-Direct agglutination assay, Passive agglutination assay) Blood grouping from stains of blood, semen, saliva and other body fluids by Absorption-inhibition, Absorption-elution and mixed agglutination techniques, determination of secretor/non-secretor status.		
5	<b>Forensic DNA fingerprinting</b> DNA Profiling / DNA Testing; History of DNA fingerprinting; Ethics, Rules, and Procedures; Restriction fragment length polymorphism (RFLP); Random amplified polymorphic DNA (RAPD); Amplified fragment length polymorphism (AFLP) Microsatellites; PCR amplifications; Single nucleotide polymorphism (SNPs); Genetic linkage mapping; Physical mapping of the genome; BAC end sequencing; Extract DNA from blood and biological material; and other tests for DNA; DNA Testing Tool, Kits, and Equipment	15	25
<b>Total Hours:</b>		60	

**Textbook:**

1. B.B. Nanda and R.K. Tiwari, Forensic Science in India: A Vision for the Twenty First Century, Select Publishers, New Delhi (2001).
2. M.K. Bhasin and S. Nath, Role of Forensic Science in the New Millennium, University of Delhi, Delhi (2002).

**Reference Books:**

1. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific and Investigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005).
2. W.G. Eckert and R.K. Wright in Introduction to Forensic Sciences, 2nd Edition, W.G. Eckert (ED.), CRC Press, Boca Raton (1997).
3. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).
4. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013).

**Course Outcomes:**

No.	Course Outcomes	RBT Level*
1	Clear understanding of the subject related concepts and contemporary issues	UN,RM
2	Illustrate the concepts, principles, and significance of impression evidence	UN,RM,AP
3	Realize the role of Forensic Serological Techniques in Forensic Biotechnology	UN,AP
4	Learn the applications of Forensic DNA fingerprinting	UN,RM,AN,AP

\*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create



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**Suggested Course Practical List:**

NA

**List of Laboratory/Learning Resources Required**

1. <https://www.sifs.in/course-details/online-course-forensic-dna-fingerprinting>
2. <https://www.sifs.in/course-details/online-course-forensic-biology-serology>

