PERIYAR UNIVERSITY

PERIYAR PALKALAI NAGAR

SALEM– 636011

DEGREE OF BACHELOR OF SCIENCE

CHOICE BASED CREDIT SYSTEM

Syllabus for

B.Sc., Digital and Cyber Forensic Science

(SEMESTER PATTERN-CBCS)

(For Candidates admitted in the College affiliated to

Periyar University from 2024-2025 onwards)

B.Sc., Digital and Cyber Forensic Science

Syllabus

REGULATIONS

1. Eligibility for Admission:

Candidate seeking admission to the first year degree of Bachelor of Science in Digital and Cyber Forensic Science shall be required to have passed the Higher Secondary Examination with Mathematics / Statistics /Computer Science /Computer Technology/Computer Applications as one of the subjects conducted by the Government of Tamil Nadu or any other examination accepted by the syndicate of Periyar University, subject to such condition as, may be prescribed thereto, are permitted to appear and qualify for B.Sc., Degree of this University after a course of three academic years.

2. Eligibility for award of degree:

A Candidate shall be eligible for the award of degree only if he/she has undergone, the prescribed course of study in a college affiliated to the University for a period not less than three academic years, comprising six Semesters and passed the examination.

3. COURSE OF STUDY AND SCHEME OFEXAMINATION

The course of study shall comprise instruction in the following subjects according to the syllabus and books prescribed from time to time. The scheme of examination of the different semesters shall be as follows;

Total Marks:	**4300**
Part I:	400
Part II:	400
Part III:	2300
Part IV:	1200
Total Credits:	**140**
Part I:	12
Part II:	12
Part III:	87
Part IV:	29

Programme Outcomes (POs)	
On successful completion of the B.Sc.,Digital and Cyber Forensic Science.	
PO1	Exhibit good **domain knowledge** and completes the assigned responsibilities effectively and efficiently in par with the expected quality standards.
PO2	Apply **analytical and critical thinking** to identify, formulate, analyze, and solve complex problems in order to reach authenticated conclusions
PO3	**Design and develop research-based solutions** for complex problems with specified needs through appropriate consideration for the public health, safety, cultural, societal, and environmental concerns.
PO4	Establish the ability to **Listen, read, proficiently communicate and articulate complex ideas** with respect to the needs and abilities of diverse audiences.
PO5	**Deliver innovative ideas to instigate new business ventures and** possess the qualities of a good entrepreneur
PO6	Acquire the qualities of a **good leader and engage in efficient decision-making.**
PO7	Graduates will be able to undertake any responsibility as an **individual/member of multidisciplinary teams and have an understanding of team leadership**
PO8	Function as s**ocially responsible individual** with ethical values and accountable to ethically validate any actions or decisions before proceeding and actively contribute to the societal concerns.
PO9	Identify and **address own educational needs i**n a changing world in ways sufficient to maintain the competence and to allow them to contribute to the advancement of knowledge
PO10	**Demonstrate knowledge and understanding of management principles a**nd apply these to one own work to manage projects and in multidisciplinary environment.

- To emphasize the importance of scientific methods in crime detection.
- To disseminate information on the advancements in the field of cyber forensic science.
- To highlight the importance of forensic science for perseverance of the society.
- To generate talented human resource, commensurate with latest requirements of digital and cyber forensic science.
- To review the steps necessary for achieving highest excellence in cyber forensic science.

- To provide a platform for students and forensic scientists to exchange views, chalk-out collaborative programs and work in a holistic manner for the advancement of forensic science.

Programme Educational Objectives (PEOs)	
The B.Sc., Digital and Cyber Forensic Science program describe accomplishments that graduates are expected to attain within five to seven years after graduation.	
PEO1	Expertise with the knowledge of investigation of cyber offenses and online frauds
PEO2	Handle cyber forensic laboratory methodologies with respect to the examination and analysis of evidence.
PEO3	Develop oral communication skills for discussing the scientific methods in a laboratory setting and effectively testifying in a court of law.
PEO4	To analytically educate the necessity to understand the impact of cybercrimes and threats with solutions in a global context.

Programme Specific Outcomes (PSOs)	
After the successful completion of B.Sc. Digital and Cyber forensic Science program the students are expected to	
PSO1	Impart education with domain knowledge effectively and efficiently in par with the expected quality standards for digital and cyber forensic science professional.
PSO2	Ability to apply the mathematical, technical and critical thinking skills in the forensic investigations.
PSO3	Ability to involve in life-long learning and adopt fast changing technology to prepare for professional development.
PSO4	Expose the students to learn the important of forensic science and criminology such as basic of cyber forensic science psychology, forensic chemistry, forensic toxicology, and cyber forensic anthropology.
PSO5	Inculcate effective communication skills combined with professional & ethical attitude.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**S**	**S**	**S**	**M**	**M**	**L**	**L**	**L**	**L**	**L**
CO2	**S**	**S**	**S**	**M**	**M**	**L**	**L**	**L**	**L**	**L**
CO3	**S**	**S**	**S**	**M**	**M**	**M**	**M**	**L**	**L**	**L**
CO4	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**L**	**L**	**L**
CO5	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**L**	**L**	**L**

*** S-Strong M- Medium L – Low**

B.Sc., DIGITAL AND CYBER FORENSIC SCIENCE-2024-2025

FIRST YEAR – SEMESTER-I

PART	Paper Code	Subject Title	Hours / Week	Credit	CIA	ESE	Total
Part – I	23UFTA01	Language – Tamil – I	6	3	25	75	100
Part – II	23UFEN01	Language English – I	6	3	25	75	100
Part - III	24UDCF01	Core Course – I: Introduction to Cyber Security	5	5	25	75	100
	24UDCFP01	Core Course –I Practical: Cyber Security Lab	4	3	25	75	100
	24UDCFE01	Elective 1: Computer System and Networks	5	4	25	75	100
Part – IV	24UDCFSE01	Skill Enhancement Course SEC-1: Cyber Crime and Cyber Law	2	2	25	75	100
	24UDCFFC01	Foundation Course – Problem Solving Techniques in C	2	2	25	75	100
		Total	**30**	**22**			700

FIRST YEAR – SEMESTER-II

PART	Paper Code	Subject Title	Hours / Week	Credit	CIA	ESE	Total
Part – I	23UFTA02	Language – Tamil - II	6	3	25	75	100
Part – II	23UFEN02	Language English – II	4	3	25	75	100
Part – IV	**NMSDC**	**Overview of English Language Communication**	**2**	**2**	**-**	**-**	**-**
Part - III	24UDCF02	Core Course – II: Python Programming	5	5	25	75	100
	24UDCFP02	Core Course –II: Practical Python Programming Lab	4	3	25	75	100
	24UDCFE02	Elective 2: Fundamentals of Forensic Science	5	4	25	75	100
Part – IV	24UDCFSE02	Skill Enhancement Course SEC-2: Forensic audio and Video Analysis	2	2	25	75	100
	24UDCFSE03	Skill Enhancement Course SEC-3: Victimology	2	2	25	75	100
		Total	**30**	**24**			700

SECOND YEAR – SEMESTER-III

PART	Paper Code	Subject Title	Hours / Week	Credit	CIA	ESE	Total
Part – I	23UFTA03	Language – Tamil - III	6	3	25	75	100
Part – II	23UFEN03	Language English - III	6	3	25	75	100
Part – III	23UDCF03	Core Course - III: Forensic Biology and Serology	5	5	25	75	100
	23UDCFP03	Core Course III: Practical Forensic Biology and Serology Lab	4	3	25	75	100
	23UDCFE03	Elective 3: Criminology and Justice	4	3	25	75	100
Part – IV	23UDCFSE04	Skill Enhancement Course SEC-4: Cryptography	2	2	25	75	100
	23UDCFSE05	Skill Enhancement Course SEC-5: Fundamentals of Information Technology	2	2	25	75	100
		Environmental Studies	1	2	25	75	100
		Health and wellness		**1**			
		Total	**30**	**24**			800

SECOND YEAR – SEMESTER - IV

PART	Paper Code	Subject Title	Hours / Week	Credit	CIA	ESE	Total
Part – I	23UFTA04	Language – Tamil - IV	6	3	25	75	100
Part – II	23UFEN04	Language English - IV	6	3	25	75	100
Part - III	23UDCF04	Core Course – IV Forensic Medicine	5	5	25	75	100
	23UDCFP04	Core Course – IV Practical: Forensic Medicine Lab	5	5	25	75	100
	23UDCFE04	Elective 4: Ethical Hacking	3	3	25	75	100
Part – IV	23UDCFSE06	Skill Enhancement Course SEC- 6: Cyber Forensic Lab	2	2	25	75	100
	NMSDC	**UI / UX Design**	**2**	**2**	**25**	**75**	**100**
		Environmental Studies	1	2	25	75	100
		Total	**30**	**25**			800

THIRD YEAR – SEMESTER - V

PART	Paper Code	Subject Title	Hours / Week	Credit	CIA	ESE	Total
Part - III	23UDCF05	Core Course – V Linux System Administration	5	4	25	75	100
	23UDCFP05	Core Course – V: Practical Linux System Administration Lab	5	4	25	75	100
	23UDCF06	Core Course – VI: Tools and Techniques for Digital and Cyber Forensic science	5	4	25	75	100
	23UDCFSE08	SEC 8: Malware Analysis and Cyber threat Intelligence	2	2	25	75	100
	23UDCFE05	Elective V: Cyber Policing	4	3	25	75	100
	23UDCFE06	Elective VI: Core Elective – I	4	3	25	75	100
Part – IV		Value Education	2	2	25	75	100
	23UDCFSE07	Internship/Field visit: - Crime scene investigation with police department/Industry	-	2	-	-	-
		Total	**30**	**24**			700

THIRD YEAR – SEMESTER - VI

PART	Paper Code	Subject Title	Hours / Week	Credit	CIA	ESE	Total
Part - III	23UDCF08	Core Course - VIII: Cyber Crime Investigation and digital Forensic	6	4	25	75	100
	23UDCFP06	Core Course: Cyber Crime Investigation and digital Forensic Lab	6	4	25	75	100
	23UDCF09	Core Course – IX: Network Security	6	4	25	75	100
	23UDCFE07	Elective VII: Core Elective – II	5	3	25	75	100
	23UDCFE08	Elective VIII: Core Elective – III	5	3	25	75	100
Part – IV	23UDCF07	Core Course – VII: Project with viva - voce	5	4	25	75	100
	23UEX01	Extension Activity	-	1	-	-	-

		Total	**30**	**23**			600

Note:

1. **Skill enhancer**: **Internship 1 and 2** Student will be complete the internship in the summer vacation. The report should be submitted as per format and review will be conducted the end of the third and fifth semester respectively.
2. **Field visit:** Students to visit the crime investigation department and have to collect the investigation procedure and submit the report.

Core Elective: I (any one)

1. DNA Typing in Forensic
2. Essential of Cyber Security
3. Criminal procedure and evidence

Core Elective: II (any one)

1. Wildlife Forensic
2. Contemporary Crimes
3. Technological methods in Forensic science

Core Elective: III (any one)

1. Forensic ballistics
2. Forensic Toxicology
3. Web Application Security

Course Code	24UDCF01	INTRODUCTION TO CYBER SECURITY	L	T	P	C
Core/Elective		Core: 1	5	1	-	5
		Basic knowledge in Cyber Security				

Course Objectives

1.Exhibit knowledge to secure corrupted systems, protect personal data, and secure computer networks in an organization
2. Understand principles of web security and to guarantee a secure network by monitoring and analyzing the nature of attacks through cyber computer forensics software/tools.
3.Understand the performance and troubleshoot cyber security systems.
4.Understand key terms and concepts in Cryptography
5. Develop cyber security strategies and policies

Expected Course Outcomes

CO1	Understand the need and nature of Cyber Security	K1 To K6
CO2	Implement mechanism for access control cryptography and authentication	
CO3	Analyze and evaluate the cyber security needs of an organization.	
CO4	Describe risk management concept and cyber security law	
CO5	Understand principles of web security and to guarantee a secure network	

K1 – Remember K2– Understand K3 – Apply K4- Analyze K5 – Evaluate k6-Create

UNIT – I	INTRODUCTION TO CYBER SECURITY	15 Hours

Introduction to Cyber Security. Confidentiality, Integrity and Availability – Triad. Attacks: Threats, Vulnerabilities and Risk. Risk Management, Risk Assessment and Analysis. Information Classification, Policies, Standards, Procedure and Guidelines. Controls: Physical, Logical and Administrative; Security Frameworks, Defense in-depth: Layers of Security. Identification and Authentication Factors. Authorization and Access Controls- Models, Methods and Types of Access Control.

UNIT II	BASICS OF CRYPTOGRAPHY	15 Hours

Definitions and Concepts, Symmetric and Asymmetric Cryptosystems, Classical Encryption Techniques – Substitution Techniques, Transposition Techniques, Block Ciphers and Stream Ciphers, Hybrid Encryption Techniques, One-Time Pad. E-mail security, Internet and Web Security. Steganography and its detection, Data Encryption Standard (DES), Principles of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange.

UNIT-III	NETWORK AND WIRELESS ATTACKS	15 Hours

Network Sniffing, Wire shark, packet analysis, display and capture filters, Etter cap, DNS Poisoning, ARP Poisoning, Denial of services, Vulnerability scanning, Setup network IDS/IPS, Router attacks, Man-in-the-middle Attack, N map, open ports, filtered ports, service detection, network vulnerability assessment, Evade anti-viruses and firewalls, Protocols, MAC Filtering, Packet Encryption, Packet Sniffing, Types of authentication, Attacks on WEP , WPA and WPA-M Encryption, fake hotspots.

UNIT -IV	NETWORK SECURITY	15 Hours

IP security architecture, Security protocols, IPSec, Web Security – Firewalls, IDS, IDPS – Types and Technologies. Trusted systems – Electronic payment protocols. Network Security Applications, Authentication Mechanisms: Passwords, Cryptographic authentication protocol, Kerberos, X.509 LDAP Directory. Digital Signatures.		
UNIT- V	**WEB SECURITY**	**15 Hours**
Web Security: SSL Encryption, TLS, SET. Intrusion detection. Securing online payments (OTP).		
Total Lecture Hours		**75 Hours**
Text Book(s)		
1	William Stallings; "Cryptography and Network Security: Principles and Practices", Fifth Edition, Prentice Hall Publication Inc., 2007.	
2	Nina Godbole and Sunit Belapore; "Cyber Security: Understanding Cyber Crimes, computer Forensics and Legal Perspectives", Wiley Publications, 2011.	
	REFERENCE BOOKS:	
1	Michael E Whiteman and Herbert J Mattord; "Principles of Information Security", Vikas Publishing House, New Delhi, 2003.	
2	Matt Bishop, "computer Security Art and Science", Pearson/PHI, 2002.	
3	Atul Kahate "Cryptography and Network Security" McGraw Hill Education (India), 2008.	
	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)	
1	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**	
2	https://www.coursera.org/learn/forensic-science	
3	https://onlinecourses.swayamM.ac.in/cec20_ge10/preview	
4	https://onlinecourses.swayamM.ac.in/cec20_ge10/preview	

Mapping with programme and outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**S**	**S**	**S**	**M**	**M**	**L**	**L**	**L**	**L**	**L**
CO2	**S**	**S**	**S**	**M**	**M**	**L**	**L**	**L**	**L**	**L**
CO3	**S**	**S**	**S**	**M**	**M**	**M**	**M**	**L**	**L**	**L**
CO4	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**L**	**L**	**L**
CO5	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**L**	**L**	**L**

*** S-Strong M- Medium L – Low**

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
24UDCFP01	PRACTICAL I : CYBER SECURITY LAB		-	-	4	IV	5	25	75	100

Learning Objectives:

1. To Understand the fundamental concepts of cryptography and the different types of encryption techniques

2.To develop an understanding of the different security algorithms and their

implementation in open-source tools like GnuPG and Snort.

3.To Gain practical experience in using various network security tools

4.To Understand the importance of secured data storage and transmission

5.To understand about intrusion detection system

	Course Outcomes	
CO1	Implement the cipher techniques.	K1 TO K6
CO2	Develop the various security Algorithms	
CO3	Use different open-source tools for network security and analysis	
CO4	Demonstrate Secured data transmission	
CO5	Installation of root kits	

K1 – Remember K2 – Understand K3– Apply K4- Analyze K5 – Evaluate K6-Create

Lab Programs	Hour
1. Implement the following Substitution & Transposition Techniques concepts: a) Caesar Cipher b) Railfan cerow & Column Transformation 2. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript 3. To implement Data Encryption Standard (DES) 4. Implement the following Attack: a) Dictionary Attack b) Brute Force Attack 5. Installation of Wireshark, tcpdump, etc. and observe data transferred in client server communication using UDP/TCP and identify the UDP/TCP datagram. 6. Installation of root kits and study about the variety of options. 7. Demonstrate intrusion detection system using any tool (snort or any others/w). 8. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures 9. Setup a honey pot and monitor the honeypot on network (KF Sensor) 10. Perform wireless audit on an access point or a router and decrypt WEP and WPA (Net Stumbler) *Software Requirements* C, C++, Java or equivalent compiler Gnu PG,Snort.	60

Mapping with programme and outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**S**	**S**	**S**	**M**	**M**	**L**	**L**	**L**	**L**	**L**
CO2	**S**	**S**	**S**	**M**	**M**	**L**	**L**	**L**	**L**	**L**
CO3	**S**	**S**	**S**	**M**	**M**	**M**	**M**	**L**	**L**	**L**
CO4	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**L**	**L**	**L**
CO5	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**L**	**L**	**L**

*** S-Strong M- Medium L – Low**

Course Code	24UDCFE01	COMPUTER SYSTEMS AND NETWORKS	L	T	P	C
Core/Elective		Core: 2	5	1	-	5
Pre – requisite		Basic knowledge in computer science				

Course Objectives

1. Learn the concept of a system in general and the computer system in specific understand the basics of communication Systems
2. Understand Basic structure, Operation and Instruction set of computers
3. Analyzing key networking protocols and their hierarchical relationship in the conceptual model like TCP/IP and OSI.
4. Use IP addressing and understand the need of various protocols.
5. Different types of network topologies and their functions

Expected Course Outcomes

CO1	To Understand the Basic fundamentals of computer Systems	K1 to K6
CO2	To Understand various types of Instruction set of computers	
CO3	To understand the various types of networking protocols	
CO4	Designing types of network topologies architecture	
CO5	To Connect the networks devices and transmission media, Analog and digital data transmission	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	INTRODUCTION TO COMPUTER SYSTEMS	15 Hours

Introduction - Evolution of Computer- Classification of computers, Applications of computers, Advantages and Disadvantages, Difference between computers and Human, computer System - components of a computer r System. computer Memory-Data Transfer between Memory and CPU, Data and Information, Microprocessors - Software -Operating System.

UNIT II	BASIC STRUCTURE AND OPERATION OF A COMPUTER	15 Hours

Functional Units of a Digital computer: Architecture – Operation and Operands of computer Hardware Instruction – Instruction Set Architecture (ISA): Memory Location, Address and Operation – Instruction and Instruction Sequencing – Addressing Modes, Encoding of Machine Instruction – Interaction between Assembly and High-Level Language.

UNIT-III	DATA COMMUNICATION AND NETWORKING	15 Hours

Introduction, use of computer Networks, classification of networks, - Reference Models - OSI and TCP/IP Models, function of the layers, TCP/IP Protocol suite, WAN, MAN, PAN, Ethernet (80M.S) - Wireless LANs –Bluetooth – WIFI-Zigbee.

UNIT –IV	NETWORK PROTOCOLS	15 Hours

Transport Layer - Services - Connection Management - Addressing, Establishing and Releasing a Connection - Simple Transport Protocol - Internet Transport Protocols (ITP), HTTP, FTP, Network Security: Need for Security, Security Attacks, Services and Mechanisms.		
UNIT- V	**NETWORK TOPOLOGIES**	**15 Hours**
Bus, Star, Ring, Mesh, Tree, Hybrid topologies architectures with their features, advantages and disadvantages of each type. Transmission Modes: simplex, half duplex and full duplex.		
Total Lecture Hours		**75 Hours**
Text Book(s)		
1	Computer System and Network Security by Gregory B. White, Eric A. Fisch, Udo W. Pooch. 1996.	
2	Computer Systems and Networks Barry G Blundell, 1st Edition, Published in 2007	
	REFERENCE BOOKS:	
1	Computer Fundamentals: Concepts, Systems &Applications, Sinha, P. K/ Sinha, P. 4th ed BPB, 2004.	
2	Computer Fundamentals, Goel, Anita, Pearson,2010.	
	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)	
1	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**	

Mapping with programme and outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**S**	**S**	**S**	**L**	**M**	**S**	**L**	**L**	**L**	**L**
CO2	**S**	**S**	**S**	**L**	**M**	**S**	**L**	**L**	**L**	**L**
CO2	**S**	**S**	**S**	**L**	**M**	**M**	**M**	**L**	**L**	**L**
CO4	**S**	**S**	**M**	**L**	**M**	**M**	**M**	**L**	**L**	**L**
CO5	**S**	**S**	**M**	**L**	**M**	**M**	**M**	**L**	**L**	**L**

*** S-Strong M- Medium L – Low**

Course Code	24UDCFSE01	CYBER CRIME AND CYBER LAW	L	T	P	C
Core/elective		Skill Enhancement Course	2	1	0	2
Pre - requisite		• Basic knowledge in crime happening in real life				

Course Objectives

1. To learn about various types of computer system used in the cybercrime
2. To know about computer forensic tools
3. To Develop the Understanding of Relationship Between commerce And Cyberspace.
4. To have in Depth Knowledge of Information Technology Act and Legal Frame Work Of Right to Privacy, Data Security and Data Protection.
5. Make Study on Various Case Studies on Real Time Crimes

Expected Course Outcomes

CO1	Understand the different theoretical and cross-disciplinary approaches	K1 to K6
CO2	Examine the assumptions about the behavior and role of offenders and victims in cyberspace, and use basic web-tools to explore behavior on-line	
CO3	Analyze and assess the impact of cybercrime on government, businesses, individuals and society	
CO4	Evaluate the effectiveness of cyber-security, cyber-laws	
CO5	To learn about IT acts and law	

K1 – Remember K2 – Understand K3– apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	CYBER CRIMES	15 Hours

Cyber Crimes, Types of Cybercrime and Financial Crimes, Hacking, Cyberspace, A Brief History of the Internet, Recognizing and Defining CO2puter Crime, Contemporary Crimes, Cyber Laws and Ethics, Law Enforcement Roles and Responses, Incident response, First Responder.

UNIT II	DIGITAL INVESTIGATION	15 Hours

Digital investigation, Digital crime scene evaluation process, Search & Seizure, Digital Forensic Lab Setup, Dead v/s Live Forensics, Types of Digital Evidences, Chain of Custody, Standard Operating Procedures of cyberForensics, Investigation Guidelines, overview of tools, Slack Space, Virtual paging

UNIT-III	EVIDENCE	15 Hours

Evidence collection form different devices, Write Protect, Write Blockers, Disk Imaging, Data

Recovery, Volatile and Non-Volatile Data Acquisition and Analysis, File Systems and Signatures, Registry Forensics, Email analysis and IP, Stenography, Cryptography, Card crimes.		
UNIT -IV	**META DATA ANALYSIS**	**15 Hours**
Metadata Analysis, Browser Forensics, History Extraction, Integrity, Hash Value, Data tampering, File Signature Analysis, Overview of Mobile Forensics, Network Forensics, Cloud Forensics and Malware Analysis.		
UNIT- V	**IT ACT AND LAW**	**15 Hours**
Introduction to IT Act M000, Basic terms and elements of the act. Amendments made in IT Act. Electronic Governance, Certifying Authorities, Digital Signature and Electronic Signature Certificates, Case Study. Legal Procedure to gather information from Outside India.		
	Total Lecture Hours	**75 Hours**

	Text Book(s)	
1	R.K. Tiwari, P.K. Sastry and K.V. Ravikumar, computer Crimes and CO2puter Forensics, Select Publishers, New Delhi (M00S).	
2	R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (M004).	
	REFERENCE BOOKS:	
1	E. Casey, Digital Evidence and computer Crime, Academic Press. London (M000).	
2	C.B. Leshin, Internet Investigations in Criminal Justice, Prentice Hall, New Jersey (1997)	
	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)	
1	https://onlinecourses.swayamM.ac.in/cecM0_cs15/preview	
2	https://onlinecourses.swayamM.ac.in/ugc19_hsM5/preview	
3	https://onlinecourses.swayamM.ac.in/cecM0_lb06/preview	
4	https://onlinecourses.swayamM.ac.in/nouMM_cs05/preview	

Mapping with programme and outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	M	L	L	L	L
CO2	S	S	S	M	M	S	S	M	L	L
CO3	S	S	S	S	M	S	M	L	L	L
CO4	S	S	S	M	M	S	S	M	L	L
CO5	S	S	S	M	M	S	S	M	L	L

*** S-Strong M- Medium L – Low**

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
24UDCFFC01	**PROBLEM SOLVING TECHNIQUES**	**FC**	2	-	-	I	2	25	75	100

Learning Objectives

1. To Familiarize with writing of algorithms, fundamentals of C and philosophy of problem solving.
2. To Implement different programming constructs and decomposition of problems into functions.
3. To Use data flow diagram, Pseudo code to implement solutions.
4. To Define and use of arrays with simple applications
5. To Understand about operating system and their uses

Course Outcomes		
	On completion of this course, students will	K1 to k6
CO1	Learn the basic knowledge of computers and analyze the programming languages.	
CO2	acquire the knowledge of the data types and arithmetic operations algorithms and Develop the program by using flowchart and pseudo code.	
CO3	Be able to explain about the various operators. Explain about the structures. Illustrate the of concept Loops	
CO4	To be able to use Numeric data and character-based data. Analyze about Arrays.	
CO5	Be able to Explain about DFD and Program modules. Creating and reading Files	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT	Contents	No. Of. Hours
I	**Introduction:** History, characteristics and limitations of Computer. Hardware/ Anatomy of Computer: CPU, Memory, Secondary storage devices, Input Devices and Output devices. Types of Computers: PC, Workstation, Mini computer, Mainframe and Super computer. Software: System software and Application software. **Programming Languages:** Machine language, Assembly language, High-level language, 4GL and 5GL-Features of good programming language. Translators: Interpreters and Compilers.	**6**

II	**Data:** Data types, Input, Processing of data, Arithmetic Operators, Hierarchy of operations and Output. Different phases in Program Development Cycle (PDC). **Structured Programming: Algorithm:** Features of good algorithm, Benefits and drawbacks of algorithm. **Flowcharts:** Advantages and limitations of flowcharts, when to use flowcharts, flowchart symbols and types of flowcharts. **Pseudocode:** Writing a pseudocode. Coding, documenting and testing a program: Comment lines and types of errors. **Program design:** Modular Programming.	**6**
III	**Selection Structures:** Relational and Logical Operators-Selecting from Several Alternatives–Applications of Selection Structures. **Repetition Structures:** Counter–Nested Loops–Applications of Repetition Structures.	**6**
IV	**Data:** Numeric data and character-based data. **arrays:** one dimensional array-two dimensional arrays–strings as arrays of characters.	**6**
V	**Data Flow Diagrams:** Definition, DFD symbols and types of DFDs. **Program Modules:** Subprograms-Value and Reference parameters-Scope of a variable-Functions–Recursion. **Files:** File Basics-Creating and reading a sequential file-Modifying Sequential Files.	**6**
	TOTAL HOURS	**30**

Textbooks	
1	**Stewart Venit,**"Introduction to Programming: Concepts and Design",Fourth Edition, 2010,DreamTech Publishers.
Web Resources	
1.	https://www.codesansar.com/computer-basics/problem-solving-using-computer.htm
2.	http://www.nptel.iitm.ac.in/video.php?subjectId=106102067
3.	http://utubersity.com/?page_id=876
4	https://onlinecourses.swayam2.ac.in/cec20_ma11/preview

Mapping with Programme Outcomes:

CO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	M	S	S	S	S	S	S	S	S
CO4	S	S	M	S	S	S	S	S	S	S
CO5	S	S	S	S	S	M	S	S	S	S

S-Strong M-Medium L -Low

SEMESTER – II

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
24UDCF02	**PYTHON PROGRAMMING**		5	-	-	IV	4	25	75	100
Learning Objectives										
1. To make students understand the concepts of Python programming. 2. To apply the OOP concept in PYTHON programming. 3. To impart knowledge on string function about lists 4. To make the students learn best practices in PYTHON programming 5. To know how to handle files in python										

Course Outcomes		
On completion of this course, students will		
CO1	To Learn the basics of python, Do simple programs on python, Learn how to use an array.	K1 to k6
CO2	To Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.	
CO3	To learn the concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules,	
CO4	To Work with List, tuples and dictionary and Write program using list, Tuples and dictionary.	
CO5	To implement file concept in python, Concept of reading and writing files.	

K1 – Remember K2– Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT	Contents	No.of Hours
I	**Basics of Python Programming:** History of Python-Features of Python - Literal-Constants-Variables-Identifiers–Keywords-Built-inDataTypes-OutputStatements–Input Statements-comments–Indentation-Operators-Expressions-Typeconversions. **Python Arrays:** Defining and Processing Arrays–Array methods.	**15**
II	**Control Statements:** Selection/Conditional Branching statements: if, if-else, nested if and if-else statements. Iterative Statements: while loop, for loop, else suite in loop and nested loops. **Jump Statements:** Break, continue and pass statements**.**	**15**
III	**Functions:** Function Definition – Function Call – Variable Scope and its Lifetime-Return Statement. **Function Arguments**: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments-Recursion. Python **Strings:** String Operations-Immutable Strings -Built-in String Methods and Functions-String comparison. **Modules: import** statement- The Python module–dir() function–Modules and Name space–Defining our own modules.	**15**
IV	**Lists:** Creating a list -Access values in List-Updating values in Lists-Nested Lists-Basic list operations-List Methods.Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples–Difference between lists and tuples. **Dictionaries:** Creating, Accessing, Updating and Deleting Elements in a Dictionary – Dictionary Functions and Methods-Difference between Lists and Dictionaries.	**15**
V	**Python File Handling:** Types of files in Python - Opening and Closing files-Reading and Writing files: write () and write lines () methods- append () method–read () and read lines () methods–with keyword–Splitting words–File Methods-File Positions-Renaming and deleting files.	
	TOTAL HOURS	**75**

Text books	
1	Reema Thareja,"Python Programming using problem solving approach", First Edition,2017,Oxford University Press.
2	Dr.R.Nageswara Rao,"Core Python Programming", First Edition, 2017,Dream tech Publishers.

Reference Books	
1.	Vamsi Kurama, “Python Programming: A Modern Approach”, Pearson Education. 10th jul M018
2.	Mark Lutz, “Learning Python”, Orielly. 2013
3.	Adam Stewarts, “Python Programming”, Online. 1019
4.	Fabio Nelli,“Python Data Analytics”,APress . 2015
5.	KennethA.Lambert,“Fundamentals of Python–First Programs”, CENGAGE Publication,2019
Web Resources	
1.	https://www.programiz.com/python-programming
2.	https://www.guru99.com/python-tutorials.html
3.	https://www.w3schools.com/python/python_intro.asp
4.	https://www.geeksforgeeks.org/python-programming-language/
5.	https://en.wikipedia.org/wiki/Python_(programming_language)

mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	M	S	S	S	S	S	M	S	S
CO4	S	S	M	S	S	S	S	S	M	S
CO5	S	S	S	S	S	M	S	S	S	S

S-Strong M-Medium L-Low

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
24UDCFP02	PYTHON PROGRAMMING LAB		-	-	4	I	4	25	75	100

Course Objectives:

1. Be able to design the basic Python applications.
2. Be able to create loops and decision statements in Python.
3. Be able to work with functions and pass arguments in Python.
4. Be able to build and package Python modules for reusability.
5. Be able to read and write files in Python.

Course Outcomes		
	On completion of this course, students will	
CO1	To implement basic of oops concept in python	K1 to k6
CO2	To apply recursion concepts in python using function.	
CO3	To implement various looping statement conditional statement in python	
CO4	To use various data structure such as list, tuples and dictionaries	
CO5	To apply various file operation in python.	

K1 – Remember K2– Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

LAB EXERCISES	Required Hours
1. Program using variables, constants, I/O statements in Python. 2. Program using Operators in Python. 3. Program using Conditional Statements. 4. Program using Loops. 5. Program using Jump Statements. 6. Program using Functions. 7. Program using Recursion. 8. Program using Arrays. 9. Program using Strings. 10. Program using Modules. 11. Program using Lists. 12. Program using Tuples. 13. Program using Dictionaries. 14. Program for File Handling.	**60**

mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	S	S	S	S	S	S
CO2	S	S	S	S	S	S	S	S	S	S
CO3	S	M	S	S	S	S	S	M	S	S
CO4	S	S	M	S	S	S	S	S	M	S
CO5	S	S	S	S	S	M	S	S	S	S

S-Strong M-Medium L-Low

Course Code	24UDCFE 02	FUNDAMENTALS OF FORENSIC SCIENCE	L	T	P	C
Core/Elective		Core: 1	5	1	-	5
Pre – requisite		Basic knowledge in Cyber Security				

Course Objectives

1. To Understand basics of Digital Forensics
2. To Understand about computing investigation.
3. To Understand the concept of Data Storage and Retrieval
4. To learn about crime and incident science
5. To know about Forensic Analysis Tools

Expected Course Outcomes

CO1	To Develop a comprehensive understanding of the principles, goals, and scope of digital forensics.	K1 To K6
CO2	To Gain knowledge of computer systems, including hardware architecture, operating systems, and file systems, to facilitate effective digital investigations.	
CO3	To Understand how data is stored and retrieved from various storage devices, and gain skills in analyzing digital evidence.	
CO4	To Gain proficiency in using forensic tools for analyzing digital evidence, such as file To carving, timeline analysis, and keyword searching.	
CO5	To Learn and apply various techniques for the proper acquisition of digital evidence, including imaging and hashing methods.	

K1 – Remember K2 – Understand K3 – Apply K4- Analyze K5 – Evaluate k6-Create

UNIT – I	FORENSICS FUNDAMENTALS	15 Hours
Computer forensics fundamentals, Benefits of forensics, computer crimes, computer forensics evidence and courts, legal concerns and private issues.		
UNIT II	**COMPUTING INVESTIGATIONS**	**15 Hours**
Understanding Computing Investigations – Procedure for corporate High-Tech investigations, understanding data recovery work station and software, conducting and investigations		
UNIT-III	**DATA ACQUISITION**	**15 Hours**
Data acquisition- understanding storage formats and digital evidence, determining the best acquisition method, acquisition tools, validating data acquisitions, performing RAID data acquisitions, remote network acquisition tools, other forensics acquisitions tools.		

UNIT -IV	**CRIMES AND INCIDENT**	**15 Hours**
Processing crimes and incident scenes, securing a computer incident or crime, seizing digital evidence at scene, storing digital evidence, obtaining digital hash, reviewing case		
UNIT- V	**FORENSICS TOOLS**	**15 Hours**
Current computer forensics tools- software, hardware tools, validating and testing forensic software, addressing data-hiding techniques, performing remote acquisitions, E-Mail investigations- investigating email crime and violations, understanding E-Mail servers, specialized E-Mail forensics tool		
	Total Lecture Hours	**75 Hours**
	Text Book(s)	
1	Warren G. Kruse II and Jay G. Heiser, "Computer Forensics: Incident Response Essentials", Addison Wesley, 2002	
2	Nelson, B, Phillips, A, Enfinger, F, Stuart, C., "Guide to Computer Forensics and Investigations, 2nd ed., Thomson Course Technology, 2006, ISBN: 0-619-21706-5.	
	REFERENCE BOOKS:	
1	**Vacca, J, Computer Forensics, Computer Crime Scene Investigation, 2nd Ed, Charles River Media, 2005, ISBN: 1-58450-389.**	
	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)	
1	https://onlinecourses.swayam2.ac.in/cec20_bt05/preview	
2	https://onlinecourses.swayam2.ac.in/cec20_bt02/preview	
3	https://nptel.ac.in/courses/105103095	
4	https://www.hugedomains.com/domain_profile.cfm?d=utubersity.com	
5	https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_pg/699	
6	https://onlinecourses.swayam2.ac.in/cec20_bt05/preview	

Mapping with programme outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	**S**	**S**	**S**	**M**	**M**	**L**	**L**	**L**	**L**	**L**
CO2	**S**	**S**	**S**	**M**	**M**	**L**	**L**	**L**	**L**	**L**
CO3	**S**	**S**	**S**	**M**	**M**	**M**	**M**	**L**	**L**	**L**
CO4	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**L**	**L**	**L**
CO5	**S**	**S**	**M**	**M**	**M**	**M**	**M**	**L**	**L**	**L**

S-Strong M-Medium L-Low

Course Code	24UDCFSE 02	FORENSIC AUDIO AND VIDEO ANALYSIS	L	T	P	C
Core/Elective		Core	6	1	0	4
Pre - requisite						

Course Objectives

1. Identify and describe different audio technology including different types of circuits, recording and playback devices and multiple video technologies
2. Apply scientific methodology in the investigation of cases where forensic analysis of audio and video evidence is required.
3. Articulate the fundamentals of voice, the physics behind the production of sound, forensic linguistics and phonetics.
4. Demonstrate competency to employ different methods and techniques in the identification and recognition of speakers in forensic cases using multiple methods.
5. To learn the concept of testing and error in speaker identification.

Course Outcomes

	On completion of this course, students will	
CO1	Understand the victimology and justice for victim of crime.	K1 to k6
CO2	Analyze the criminological perspectives and its types.	
CO3	Understand the victims of various crime activities	
CO4	Analyze the victim services of the various crime and understand the National victim Assistance(NOVA)	
CO5	Understand the importance of audio video evidence in interpretation of a crime	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	**14 Hours**
Introduction to Forensic Video & Audio Analysis, A basic understanding of forensic video technology, Legal concepts regarding Digital Multi-Media Evidence.	
UNIT II	**17 Hours**
Digitizing, playback and analysis of video,Application of video evidence in the legal setting, Recovery of digital video / Deleted Video & Audio Files recovery, Scientific methodology of forensic video analysis.	
UNIT III	**16 Hours**
Exporting evidence as video or still image files, Video and Audio Evidence handling procedures, Digital image processing.	
UNIT IV	**14 Hours**
Audio Analysis Methodology, Speech and Noise Characteristics, Audio Clarification Principles, Voice identification, Author identification, Forensic phonetics,	
UNIT V	**14 Hours**
Speaker identification, Voice spectrograph, Tools and Softwares used in Video and Audio Analysis, Noise	

Reduction Tools, Photo Analysis, Ethics for the Expert Witness.		
TOTAL		**75 Hours**
	REFERENCE BOOKS:	
1	Principles of Forensic Audio Analysis (Modern Acoustics and Signal Processing)	
2	Deep Learning for Multimedia Forensics (Foundations and Trends® in Computer Graphics and Vision)	
3	Mobile Forensic Investigations: A Guide to Evidence Collection, Analysis, and Presentation	
4	Forensic Speaker Identification (International Forensic Science and Investigation)	
5	The Rout ledge Handbook of Forensic Linguistics (Rout ledge Handbooks in Applied Linguistics)	
6	Forensic Speaker Recognition: Law Enforcement and Counter-Terrorism	
	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)	
1	https://www.ifsedu.in/forensic-audio-and-video-analysis/	
2	https://onlinecourses.swayam2.ac.in/cec21_lb05/preview	
3	https://www.mooc-list.com/tags/forensic	
4	https://archive.nptel.ac.in/course.html	

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	M	M	M	M	L	L	L	L
CO2	S	S	S	M	M	M	L	L	L	L
CO3	S	S	M	M	L	M	L	L	L	L
CO4	S	S	M	M	L	L	L	L	L	L
CO5	**S**	**S**	**M**	**L**	**M**	**M**	**L**	**L**	**L**	**L**

*** S-Strong M- Medium L - Low**

Course Code	24UDCFSE 03	VICTIMOLOGY	L	T	P	C
Core/Elective			6	1	0	4
Pre - requisite						

Course Objectives

1. To familiarize the students of Criminology with the functioning of the various institutions of the criminal justice system and juvenile justice system.
2. To increase familiarity with basic terms, concepts, and ideas in Victimology in Spanish and English.
3. To Gain a thorough knowledge of the core literature and debates that make up the• discipline of Victimology.
4. To understand methods to measure victimization.
5. To develop an understanding of the interactions between victims and offenders.

Expected Course Outcomes

CO1	Understand the victimology and justice for victim of crime.	K1 To k6
CO2	Analyze the criminological perspectives and its types.	
CO3	Understand the victims of various crime activities	
CO4	Analyze the victim services of the various crime and understand the National victim Assistance (NOVA)	
CO5	To understand criminal **Justice System**	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	VICTIMOLOGY	14 Hours

Basics Victimology: Basic Concepts - Historical development of Victimology. Meaning and Definition of victim. National and International concern for victims of crime – UN Amnesty International - UN Declaration of Basic Principles of Justice for Victims of Crime and Abuse of Power, 1985. Handbook of Justice for Victims, 1998. Guide for Policy Makers, 1998. USA - Patterns of Criminal Victimization - Role of victims in Criminal Occurrence, Victim – Offender relationship. Impact of Victimization– Physical and financial impact.

UNIT II	PERSPECTIVES ON VICTIMIZATION	17 Hours

Criminological perspectives: repeat victimization, routine activities, lifestyle exposure, fear of crime, victimization surveys including cost of crime. Psychological perspectives: Effects of crime on victims and the way victims are viewed. Legal perspectives: Rights of the Crime Victims – Victim in the criminal Justice System, Need and Significance of Victim oriented Justice System. Sociological perspectives: analysis of social reaction to crime and victimization over the Ages, the importance of feminist and critical theory and the development of the victim Movement and victim advocacy.

UNIT-III	INDIVIDUAL AND MASS VICTIMIZATION	16 Hours

Victims of traditional crime. Women victims - Dowry, battered women, Rape and other kinds of Sexual harassment - Child abuse. Cyber Crime Victimization of Women and Children. Trafficking in women and children. Victims of abuse of power, Genocide, Crimes against humanity, Internally Displaced persons, Victims of War - Child Soldiers, Refugees

UNIT -IV	CRIMINAL JUSTICE SYSTEM AND VICTIMS	14 Hours

CJS and victim relationship: Collaborator or evidence - Victim & Police: Lodging of FIR & recording of statement - Deposition & cross-examination in courts. – Secondary Victimization by the criminal justice system and the society– Role of judiciary in Justice for victims. Creating awareness among the

criminal justice professionals and the public on victim issues.		
UNIT- V	**VICTIM ASSISTANCE**	**14 Hours**
Alternative services for crime victims – victims support Services in the developed countries – Victim support services in India. Types of assistance. Offender Restitution Programs - Victim Witness Programs – Crisis Intervention – Victim Advocacy – Introduction to Restorative Justice and Principles of Restorative Justice – Victim compensation and restitution. Compensation for victims of crime: Indian Scenario. Advantages and disadvantages of Criminal Justice – based victim support schemes- All Women Police Stations- .Role of NGOs and Professional associations, ISV, WSV, Child Line, One Stop Shop and National Organization for Victim Assistance (NOVA).		
	Total Lecture Hours	**75 Hours**
	Text Book(s)	
1	Chockalingam, K. 1985, Readings in Victimology, Raviraj Publications, Chennai.	
2	Karmen, A, Crime Victims: An Introduction to Victimology, (2nd Edition) 1990	
	REFERENCE BOOKS:	
1	VictimologyBy William G. Doerner , Steven P. Lab 9th Edition	
2	D.E. Zulawski and D.E. Wicklander, Practical Aspects of Interview and Interrogation, CRC Press, Boca Raton (2002).	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	https://onlinecourses.swayam2.ac.in/cec21_lw04/preview	
2	https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_ug/344	

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	M	M	M	M	L	L	L	L
CO2	S	S	S	M	M	M	L	L	L	L
CO3	S	S	M	M	L	M	L	L	L	L
CO4	S	S	M	M	L	L	L	L	L	L
CO5	**S**	**S**	**M**	**L**	**M**	**M**	**L**	**L**	**L**	**L**

*** S-Strong M- Medium L - Low**

SEMESTER -III

Course Code	23UDCF03	FORENSIC BIOLOGY AND SEROLOGY	L	T	P	C
Core/elective/Supportive			5	1	0	4
Pre - requisite						

Course Objectives

1. To understand of biological and serological evidence.
2. To understand the Blood sampling evidence in accidents, murder cases, and violent crime investigations
3. To equip with skills and knowledge about various techniques used to perform biological evidence analysis,
4. To learn how to analyze blood, semen, and other biological samples and understand the principles of DNA analysis,
5. To open doors to several career opportunities, from forensic labs to crime scene investigations.

Expected Course Outcomes

CO1	Understand the general concepts and definitions used in Forensic Biology and serology.	K1 to k6
CO2	Understand the role of Forensic biologists in crime scene investigation	
CO3	Examine the biological evidence with laboratory handling procedures	
CO4	Analyze the Importance of Forensic Entomology and Wildlife Forensics	
CO5	Work with public and private sector forensic labs, as an instructor with forensic institutes, or set up your own lab.	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	BIOLOGICAL EVIDENCE	14 Hours

Nature and importance of biological evidence. Collection and preservation of common biological evidences. Significance and origin of hair evidence. Transfer, persistence and recovery of hair evidence. Structure of human hair. Comparison of hair samples. Morphology and biochemistry of human hair. Comparison of human and animal hair. Importance of pollen grains, wood and diatoms in Forensic science.

UNIT II	COMMON BODY FLUIDS	17 Hours

Composition and functions of blood. Collection and preservation of blood evidence. Distinction between human and non-human blood- Origin determination. Determination of blood groups. Forensic characterization of bloodstains. Typing of dried stains. Blood enzymes and proteins. Semen. Forensic significance of semen. Composition, functions and morphology of spermatozoa. Collection, evaluation and tests for identification of semen. Individualization on the basis of semen examination.

Composition, functions and Forensic significance of saliva, sweat, urine, fecal stains, milk and vomit. Tests for their identifications.		
UNIT-III	**BLOODSTAIN**	**16 Hours**
Bloodstain characteristics. Impact bloodstain patterns. Cast -off bloodstain patterns. Projected bloodstain patterns. Contact bloodstain patterns. Blood trails. Bloodstain drying times. Documentation of bloodstain pattern evidence. Crime scene reconstruction with the aid of bloodstain pattern analysis.		
UNIT - IV	**ENTOMOLOGY**	**14 Hours**
Basics of Forensic entomology. Insects of Forensic importance. Collection of entomological evidence during death investigations.		
UNIT- V	**SIGNIFICANCE OF WILDLIFE FORENSICS**	**14 Hours**
Significance of Wildlife Forensics. Organizations involved. IUCN Red ListConservation Status- Extinct, Extinct in Wild, Critically Endangered, Endangered, Vulnerable, Near Threatened, Least Concern. List of protected species in India. Illegal trading of wildlife items. Identification of Physical evidences pertaining to wildlife crime		
	Total Lecture Hours	**75 Hours**

Text Book(s)		
1	Alan Gunn, Essential Forensic Biology, 2nd Edition, Wiley (2009)	
2	J. M. Butler, Advanced Topics in Forensic DNA Typing, Academic Press, (2014).	
	REFERENCE BOOKS:	
1	Handbook For Forensic Biology, by Shadma Siddiqui Chandra Bahadur Singh Dangi 2020	
2	Forensic serology by Shanan S Tobe, Elsevier Science, 2022	
	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)	
1	https://onlinecourses.swayam2.ac.in/cec20_bt05/preview	
2	https://onlinecourses.swayam2.ac.in/cec20_bt02/preview	
3	https://nptel.ac.in/courses/105103095	
4	https://www.hugedomains.com/domain_profile.cfm?d=utubersity.com	
5	https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_pg/699	

Mapping with programme outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	L	L	L	L
CO2	S	S	S	M	M	L	L	L	L	L
CO3	S	S	S	M	M	S	S	M	L	L
CO4	S	S	S	S	M	S	M	L	L	L
CO5	**S**	**S**	**M**	**L**	**M**	**M**	**L**	**L**	**L**	**L**

*** S-Strong M- Medium L - Low**

Course Code	23UDCFP03	FORENSIC BIOLOGY AND SEROLOGY LAB	L	T	P	C
Core/Elective/Supportive		Core lab	-	-	5	4
Pre - requisite		• Basic knowledge in biology and blood stains.				

Course Objectives
1. To gain knowledge of the significance of serological evidence. 2. To know the importance of biological fluids – blood, urine, semen, saliva, sweat and milk – in crime investigations. 3. To apply knowledge of genetic markers in forensic investigations. 4. To know about forensic importance of bloodstain patterns 5. To apply the skills to carry-out serological tests

Expected Course Outcomes		
CO1	Identify and examine hair and other biological evidences	K1 To K6
CO2	Measure the various biological samples through the test.	
CO3	Apply the skills to carry-out serological tests.	
CO4	Experiment the science of bloodstain pattern analysis	
CO5	To learn about forensic biology and serology	
K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create		

1. To examine hair morphology and identify species.
2. To carry out microscopic examination of pollen grains.
3. To carry out microscopic examination of diatoms.
4. To carry out preliminary and confirmatory tests for blood.
5. To determine the blood group from fresh and dried blood stains.
6. To identify the given stain as saliva.
7. To identify the given stain as urine.
8. To identify various bloodstain patterns in a crime scene.
9. To prepare a case report on Wildlife Forensics.
10. To prepare a case report on Forensic Entomology.

Total practical Hours	**60 Hours**

Text Book(s)

1	Alan Gunn, Essential Forensic Biology, 2nd Edition, Wiley (2009)
2	J. M. Butler, Advanced Topics in Forensic DNA Typing, Academic Press, (2014).

	REFERENCE BOOKS:	
1	Forensic serology by Shanan S Tobe, Elsevier Science, 2022	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	https://onlinecourses.swayam2.ac.in/cec20_bt05/preview	
2	https://onlinecourses.swayam2.ac.in/cec20_bt02/preview	
3	https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_pg/699	

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	M	L	L	L	L
CO2	S	S	S	M	M	L	L	L	L	L
CO3	S	S	S	M	M	S	S	M	L	L
CO4	S	S	S	S	M	S	M	L	L	L
CO5	**S**	**S**	**M**	**L**	**M**	**M**	**L**	**L**	**L**	**L**

*** S-Strong M- Medium L - Low**

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23UDCFE03	CRIMINOLOGY AND JUSTICE	Elect	5	-	-	-	3	25	75	100

Learning Objectives

1. Explain the history, origin, scope and definition of crime, its relevance in the present scenario and its relation to other social sciences.
2. Understand the interdisciplinary nature of Criminology and the role of criminologists in the criminal justice system.
3. Describe the different schools of Criminology and critically identify the contribution of each school of thought for the growth and development of Criminology.
4. Describe the typologies of crime including crimes against body, crimes against property, contemporary crimes like cybercrime, white collar crime, etc.
5. Apply the concept of crime and criminal behaviour to understand juvenile delinquency.
6. Describe typologies of criminal behaviour like dossier criminal, habitual offenders, professional criminals, etc.

Course Outcomes

On completion of this course, students will

CO1	Keep pace with emerging developments in criminal justice;	K1 To K6
CO2	Create well-informed citizens and professionals in the area of criminal justice; and	
CO3	Enhance the competencies of the professionals already working in the area of criminal justice system.	
CO4	Apply the various Authentication schemes to simulate different applications.	
CO5	Understand standards of various Security practices and System security	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT	Contents	No. Of. Hours
I	**Introduction to Crime** Crime – Definitions – Historical perspectives – Nature and origin – Elements of crime –Deviance, social context of deviance and delinquency – Typologies of crime and criminal behaviour	**15**

II	**Unit II: Introduction to Criminology** Criminology and its definition – Development of Criminology – Nature and scope –Criminology and its relations with other social sciences – Criminology's interdisciplinary nature	**15**
III	**Unit III: Schools of Criminology** Pre-classical school – Classical school – Neo-classical school – Positive school – Biological positivism – Cartographic school	**15**
IV	**Sociological Explanation of Criminal Behaviour** Differential association theory (Edwin Sutherland) – Social bond theory (Travis Hirschi) –Subculture of violence (Wolfgang and Ferracuti) – Sub-cultural theory (Albert Cohen) – Law of imitation (Tarde) – Techniques of neutralization (Matza and Sykes) – Feminist criminology	**15**
V	**Critical Explanation of Criminal Behaviour** Historical materialism, mode of production, alienation and class struggle (Karl Marx) – Early Marxist views of crime (William Bonger) – Lower proletariat, class, state and crime (Richard Quinney) – Analysis of Criminal Justice System (William Chambliss) – Multiple factor approach to crime causation	**15**
TOTAL HOURS		**75**

Text books

1. Ahmed Siddique, (2005), *Criminology, Problems and Perspectives*, III Edn. Eastern Book House, Lucknow.
2. Allen, Friday, Roebuck and Sagarin, (2006), *Crime and Punishment: An introduction to Criminology*. The Free press. New York.
3. Brenda S. Griffin and Charles T.Griffin, (2007), *Juvenile Delinquency in perspective, Harper and Row*, New York
4. Brendan Maguire & Polly F. Radosh, (2015), *Introduction to Criminology*, Wadsworth Publishing Company, Boston, U.S.A.
5. Chockalingam, K. (2021), *'Kuttraviyal'* (Criminology) in Tamil, ParvathiPublications, Chennai.

Reference Books

1. Hagan, F. (2017). *Introduction to criminology* (9th ed.). Los Angeles: SAGE.
2. Harry E., Friday, P., Roebuck, J., & Edward, S. (1981). *Crime and punishment: An introduction to criminology*. New York: Free Press.
3. Marsh, I. (2007). *Theories of crime*. London: Routledge.
4. Harry Elmer Barnes and Negley K. Teeters, (1966), *New Horizons in Criminology, Prentice Hall*, New Delhi.
5. John E.Conklin, J.E., (1981), *Criminology*, Macmillan, London.
6. Paranjepe, N.V., (2002). *Criminology and Penology*, Central Law Publications, Allahabad.
7. Renzetti, C. (2013). *Feminist criminology*. Routledge.
8. Siegel, L. (2017). *Criminology: Theories, patterns and typologies* (13th ed.). Sydney: Cengage Learning.
9. Sutherland, E. H., &Cressey, D. R. (1974). *Principles of criminology*. Philadelphia, PA: Lippincott.

	WebResources
1	https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_ug/203
2	https://www.douglascollege.ca/course/crim-2252

Mapping with programme outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	L	L	L	L
CO2	S	S	S	M	M	L	L	L	L	L
CO3	S	S	S	M	M	S	S	M	L	L
CO4	S	S	S	S	M	S	M	L	L	L
CO5	**S**	**S**	**M**	**L**	**M**	**M**	**L**	**L**	**L**	**L**

*** S-Strong M- Medium L - Low**

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23UDCFSE04	**CRYPTOGRAPHY**		5	-	-	-	3	25	75	100

Learning Objectives

1. To understand the fundamentals of Cryptography
2. To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
3. To understand the various key distribution and management schemes.
4. To understand how to deploy encryption techniques to secure data in transit across data networks
5. To design security applications in the field of Information technology

Course Outcomes

On completion of this course, students will

CO1	Analyze the vulnerabilities in any computing system and hence be able to design a security solution.	K1 To K6
CO2	Apply the different cryptographic cryptographic algorithms Operations of symmetric	
CO3	Apply the different cryptographic cryptography Operations of public key	
CO4	Apply the various Authentication schemes to simulate different applications.	
CO5	Understand standards various Security practices and System security	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT	Contents	No. Of.Hours
I	**Introduction:** The OSI security Architecture–Security Attacks–Security Mechanisms–Security Services–A model for network Security.	**15**
II	**Classical Encryption Techniques:** Symmetric cipher model– **Substitution Techniques:** Caesar Cipher – Mono alphabetic cipher – Play fair cipher–Poly Alphabetic Cipher–Transposition techniques– Stenography	**15**
III	**Block Cipher and DES:** Block Cipher Principles–DES–The Strength of DES–**RSA:**The RSA algorithm.	**15**

IV	**Network Security Practices**: IP Security overview-IP Security architecture–Authentication Header.**Web Security**:Secure Socket Layer And Transport Layer Security–Secure Electronic Transaction.	**15**
V	Intruders–Malicious software–Firewalls.	**15**
TOTAL HOURS		**75**

Text books	
1	**William Stallings,**"Cryptography and Network Security Principles and Practices".
Reference Books	
1.	**Behrouz A.Foruzan,**"Cryptography and Network Security",Tata McGraw-Hill, 2007.
2	**AtulKahate**,"*Cryptography and Network Security*",Second Edition,2003,TMH.
3	**M.V.ArunKumar**,"*Network Security*",2011,First Edition,USP.
	Web Resources
1	https://www.tutorialspoint.com/cryptography/
2	https://gpgtools.tenderapp.com/kb/how-to/introduction-to-cryptography
3	https://onlinecourses.nptel.ac.in/noc20_cs02/preview#:
4	https://onlinecourses.nptel.ac.in/noc22_cs90/preview
5	https://onlinecourses.swayam2.ac.in/cec20_cs15/preview

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	M	L	L	L	L
CO2	S	S	S	M	M	L	L	L	L	L
CO3	S	S	S	M	M	S	S	M	L	L
CO4	S	S	S	S	M	S	M	L	L	L
CO5	**S**	**S**	**M**	**L**	**M**	**M**	**L**	**L**	**L**	**L**

*** S-Strong M- Medium L - Low**

Subject Code	Subject Name	Category	L	T	P	S	Inst. hours	Credits	Marks		
									CIA	External	Total
23UDCFSE05	**FUNDAMENTALS OF INFORMATION TECHNOLOGY**	SkillEnha.Course (SEC)	2	-	-	-	2	2	25	75	100

Learning Objectives

1. Understand basic concepts and terminology of information technology.
2. Have a basic understanding of personal computers and their operation
3. Be able to identify data storage and its usage
4. Get great knowledge of software and its functionalities
5. Understand about operating system and their uses

Course Outcomes		
	On completion of this course, students will	
CO1	Learn the basics of computer, Construct the structure of the required things in computer, learn how to use it.	K1 To K6
CO2	Develop organizational structure using for the devices present currently under input or output unit.	
CO3	Concept of storing data in computer using two headers namely RAM and ROM with different types of ROM with advancement in storage basis.	
CO4	Work with different software, Write program in the software and applications of software.	
CO5	Usage of Operating system in information technology which really acts as a interpreter between software and hardware.	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT		Contents	No. Of.Hours
I		**Introduction to Computers:** Introduction, Definition, Characteristics of computer, Evolution of Computer, Block Diagram Of a computer, Generations of Computer, Classification of Computers, Applications of Computer, Capabilities and limitations of computer	**6**
II		**Basic Computer Organization:** Role of I/O devices in a computer system. Input Units: Keyboard, Terminals and its types. Pointing Devices, Scanners and its types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units: Monitors and its types. Printers: Impact Printers and its types. On Impact Printers and its types, Plotters, types of plotters, Sound cards, Speakers.	**6**

III		**Storage Fundamentals:** Primary Vs Secondary Storage, Data storage & retrieval methods. Primary Storage: RAM ROM, PROM, EPROM, EEPROM. Secondary Storage: Magnetic Tapes, Magnetic Disks. Cartridge tape, hard disks, Floppy disks Optical Disks, Compact Disks, Zip Drive, Flash Drives	**6**
IV		**Software:** Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their Advantages & disadvantages. Application S/W and its types: Word Processing, Spreadsheet's Presentation, Graphics, DBMS s/w	**6**
V		**Operating System:** Functions, Measuring System Performance, Assemblers, Compilers and Interpreters. Batch Processing, Multi programming, Multi-Tasking, Multi processing, Time Sharing, DOS, Windows, Unix/Linux.	**6**
		TOTALHOURS	**30**

Text books		
1		Anoop Mathew, S.Kavitha Murugeshan (2009),— Fundamental of Information Technology, Majestic Books.
2		Alexis Leon, Mathews Leon, ‖Fundamental of Information Technology‖,2nd Edition.
3		S. K Bansal, —Fundamental of Information Technology‖.
Reference Books		
1.		Bhardwaj Sushil Puneet Kumar, —Fundamental of Information Technology‖
2.		GGWILKINSON, —Fundamentals of Information Technology, Wiley-Blackwell
3.		A Ravichandran,—Fundamentals of Information Technology, Khanna Book Publishing
Web Resources		
1.		https://testbook.com/learn/computer-fundamentals
2.		https://www.tutorialsmate.com/2020/04/computer-fundamentals-tutorial.html
3.		https://www.javatpoint.com/computer-fundamentals-tutorial
4.		https://www.tutorialspoint.com/computer_fundamentals/index.htm
5.		https://www.nios.ac.in/media/documents/sec229new/Lesson1.pdf

Mapping with programme outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	L	L	L	L
CO2	S	S	S	M	M	L	L	L	L	L
CO3	S	S	S	M	M	S	S	M	L	L
CO4	S	S	S	S	M	S	M	L	L	L
CO5	**S**	**S**	**M**	**L**	**M**	**M**	**L**	**L**	**L**	**L**

*** S-Strong M- Medium L - Low**

SEMESTER IV

Subject Code	Subject Name	Category	L	T	P	S	Credits	Marks		
								CIA	External	Total
23UDCFE04	**ETHICAL HACKING**	**CC**	6	-	-	V	4	25	75	100

Learning Objectives

1. To introduce the concepts of security and various kinds of attacK3
2. Introduction about scanning and enumeration procedure
3. To learn about system hacking
4. To learn about tools for identifying vulnerability
5. To explain about penetration testing

Course Outcomes		
Classify Various hacking techniques and attacks		
CO1	Understand Where information networks are most vulnerable	K1 TO K6
CO2	Understand and apply the concepts of system Hacking	
CO3	Understand and apply the programming concepts for hacking	
CO4	Distinguish and examine the function and phases in penetration testing	
CO5	Classify Various hacking techniques and attacks	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT	Contents	Hours
I	Introduction to Hacking–Importance of Security–Elements of Security –Phases of an Attack–Types of Hacker Attacks–Hacktivism–Vulnerability Research–Introduction to Foot printing–Information Gathering Methodology–Foot printing Tools–WHOISTools–DNS Information Tools–Locating the Network Range– Meta Search Engines.	**15**
II	Introduction to Scanning –Objectives–Scanning Methodology –Tools –IntroductiontoEnumeration–EnumerationTechniques– EnumerationProcedure–Tools	**15**
III	**System Hacking:** Introduction – Cracking Passwords – Password Cracking Websites–Password Guessing–Password Cracking Tools–Password Cracking Counter measures–Escalating Privileges–Executing Applications–Keyloggers and Spyware.	**15**

IV	**Programming For Security Professionals:** Programming Fundamentals – C language–HTML–Perl–Windows OS Vulnerabilities–Tools for Identifying Vulnerabilities–Countermeasures–Linux OS Vulnerabilities– Tools for Identifying Vulnerabilities–Countermeasures	**15**
V	**Penetration Testing:** Introduction–Security Assessments–Types of Penetration Testing-Phases of Penetration Testing–Tools–Choosing Different Types of Pen-Test Tools–Penetration Testing Tools.	**15**
	TOTAL HOURS	**75**

	Text books
1	EC- Council,Ethical Hacking and Counter measures:Attack Phases, Cengage Learning,2010. Michael.T.Simpson,Kent Backman,James.E.Corley,"Handson Ethical Hacking and Network Defense",CengageLearning,2013
	Reference Books
1	Patrick Engebretson,―The Basics of Hacking and PenetrationTesting– Ethical Hacking and Penetration Testing Made Easy, Second Edition,Elsevier,2013
2	Rafay Boloch,―Ethical Hacking and PenetrationTestingGuide‖,CRCPress,2014
3	Jon Erickson,―Hacking, The Art of Exploitation, 2nd Edition:No Starch PressInc.,2008
	Web Resources
1	.https://www.scribd.com/document/538684936/Hands-On-Ethical-Hacking-and- Network-Defense-PDFDrive
2	https://onlinecourses.swayam2.ac.in/cec20_cs15/preview
3	https://onlinecourses.nptel.ac.in/noc22_cs13/preview

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	M	L	L	L	L
CO2	S	S	S	M	M	L	L	L	L	L
CO3	S	S	S	M	M	S	S	M	L	L
CO4	S	S	S	S	M	S	M	L	L	L
CO5	**S**	**S**	**M**	**L**	**M**	**M**	**L**	**L**	**L**	**L**

*** S-Strong M- Medium L - Low**

Course Code	23UDCF04	FORENSIC MEDICINE	L	T	P	C
Core/Elective/Supportive		Core: 8	5	1	0	5
Pre - requisite		• Basic knowledge in the chemistry.				

Course Objectives

1. To understand and identification of informed Medico-legal responsibility
2. To Describe the various legal procedures pertaining to medical practice and pertaining to human body
3. To Depose efficiently in court of law for medico legal cases
4. To Identify the legal aspects of medical practices
5. To List the duties, responsibilities and rights of a registered medical practitioner

Expected Course Outcomes

CO1	Understand about the first responding officer roles and responsibilities.	K1 To K6
CO2	To analyze about death scenes to ascertaining whether the crime was staged to appear as suicide, accident or homicide.	
CO3	Compare of External and internal autopsy findings in determining medico legal aspects of death.	
CO4	To construct the report of giving medical legal answers of various modes of deaths	
CO5	To Explain the history of Forensic Medicine	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	DEATH INVESTIGATIONS	14 Hours

Fundamental aspects and scope of forensic medicine. Approaching the crime scene of death. Obtaining first hand information from the caller. Rendering medical assistance to the victim, if alive. Protecting life. Recording dying declaration. Identifying witnesses and, if possible, suspect. Interviewing onlookers and segregating possible witnesses. Suspect in custody – initial interrogation and searching for evidence.

UNIT II	ROLE OF FORENSIC MEDICINE & SUBMISSION PROCEDURE	15 Hours

Role of Forensic Medicine in court – Meaning and Scope Inquest Nature and Powers of Criminal Courts in India Procedure of calling a witness to a court. Procedure in court: Oath Examination – in – chief, Cross Examination and Re-Examination Medical Evidence Medico legal Reports and Dying declaration Doctor as medical/ Expert witness

UNIT-III	AUTOPSY	15 Hours

Autopsy Medical Autopsy: Introduction and objectives, rules for medico legal autopsy, external and internal examination of body, collection of Ante-mortem and post-mortem samples, autopsy report

UNIT -IV	THANATOLOGY	16 Hours
Definition of death. Types of death(somatic and molecular).Medico-legal aspects of death – Causes of death such as asphyxia(strangulation, hanging, drowning etc), electrocution, thermal trauma, heat burns, starvation, natural death, sudden death etc. Changes after death (immediate, early and late changes) and Determination of time since death.		
UNIT- V	**WOUNDS AND INJURIES**	**15 Hours**
Definition of wounds, injuries, and laws governing them. Types and classification of injuries. Ante mortem and post mortem injuries. Aging of injuries. Artificial injuries. Difference between suicidal, homicidal and accidental injuries.		
Total Lecture Hours		**75 Hours**
Text Book(s)		
1	Forensic medicine and toxicology: principles and practice, Professor Krishna Vij Publisher: Elsevier, 5th Edition ,2014	
2	Practical Aspects of Forensic Medicine, Dr T.D. Dogra Dr. AD Aggrawal jaypee publishers,2014.	
	REFERENCE BOOKS:	
1	Parikh's textbook of medical jurisprudence, forensic medicine and toxicology Professor C. K. Parikh,CBS; 6th edition, 2007	
2	The essentials of forensic medicine and toxicology Professor K.S. Narayan Reddy Jaypee Brothers Medical Publishers; 34th edition 2017	
	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)	
1	https://nptel.ac.in/noc/courses/noc17/SEM2/noc17-cy03/	
2	https://nptel.ac.in/courses/104/105/104105084/	
3	https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_pg/701	
4	https://onlinecourses.swayam2.ac.in/nou23_cs05/preview	

Mapping with programme outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	L	L	L	L
CO2	S	S	S	M	M	L	L	L	L	L
CO3	S	S	S	M	M	S	S	M	L	L
CO4	S	S	S	S	M	S	M	L	L	L
CO5	**S**	**S**	**M**	**L**	**M**	**M**	**L**	**L**	**L**	**L**

*** S-Strong M- Medium L - Low**

Course Code	23UDCFP04	FORENSIC MEDICINE LAB	L	T	P	C
Core/elective/Supportive		Elective 4: Generic/ Discipline	-	-	3	3
Pre - requisite		• Basic knowledge in the crime scene and marks in death				

Course Objectives

1. To learn about the examination and assessment of individuals who have suspected, injured, or killed by external influence.
2. To Perform and explain crime scene security, approaching a scene, searches and documentation of evidence
3. To Perform basic photography as it is related to crime scenes
4. To Perform latent print recovery using different processing methodology and documentation
5. To Perform tasks related to trace evidence identification and recovery

Expected Course Outcomes

CO1	Understand the cause of death	K1 To K6
CO2	Create a checklist in the crime scene	
CO3	Analyze the marks in the death scene	
CO4	Create a questionnaire for first responder in the crime spot	
CO5	Explain Growth of Forensic Medicine & Toxicology	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

1. To design a questionnaire for the first responder to the death scene.
2. To design a protocol to deal with the media at the crime scene.
3. To design a checklist for the forensic scientists at the death scene.
4. To design a canvass form giving description of an unidentified victim.
5. To analyze and preserve bite marks.
6. To study different stages of changes after death
7. To identify shooter on the basis of firearm injuries
8. To identify different causes of death
9. To study post-mortem findings of a cadaver
10.

Total Practical Hours	**60 Hours**

Text Book(s)

1	Practical Guide for Forensic Medicine and Toxicology by K Tamilmani, Jaypee brother 2021.
	REFERENCE BOOKS:

1	T. Bevel and R.M. Gardner, Bloodstain Pattern Analysis, 3rd Edition, CRC Press, (2008)
	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc.)
1	https://nptel.ac.in/noc/courses/noc17/SEM2/noc17-cy03/
2	https://nptel.ac.in/courses/104/105/104105084/

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	M	L	L	L	L
CO2	S	S	S	M	M	L	L	L	L	L
CO3	S	S	S	M	M	S	S	M	L	L
CO4	S	S	S	S	M	S	M	L	L	L
CO5	**S**	**S**	**M**	**L**	**M**	**M**	**L**	**L**	**L**	**L**

*** S-Strong M- Medium L - Low**

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst.Hou	Marks		
									CIA	External	Total
23UDCFSE07	PATTERN RECOGNITION	Skill Enha. Course (SEC)	2	-	-	-	2	2	75	25	100

Learning Objectives

1. To learn the fundamentals of Pattern Recognition techniques
2. To learn the various Statistical Pattern recognition techniques
3. To learn the linear discriminant functions and unsupervised learning and clustering
4. To learn the various Syntactical Pattern recognition techniques
5. To learn the Neural Pattern recognition techniques

Course Outcomes		
On completion of this course, students will		
CO1	Understand the concepts, importance, application and the process of developing Pattern recognition overview	K1 To K6
CO2	To have basic knowledge and understanding about Parametric and non-parametric related concepts.	
CO3	To understand the framework of frames and bit images to animations	
CO4	Speaks about the multimedia projects and stages of requirement in phases of project.	
CO5	Understanding the concept of cost involved in multimedia planning, designing, and producing	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT	Contents
I	**PATTERN RECOGNITION OVERVIEW**: Pattern recognition, Classification and Description-Patterns and feature Extraction with Examples-Training and Learning in PR systems-Pattern recognition Approaches
II	**STATISTICAL PATTERN RECOGNITION**: Introduction to statistical Pattern Recognition-supervised Learning using Parametric and Non-Parametric Approaches.
III	**LINEAR DISCRIMINANTFUNCTIONS AND UNSUPERVISED LEARNING AND CLUSTERING**: Introduction-Discrete and binary Classification Problems-Techniques to directly Obtain linear Classifiers-Formulation of Unsupervised Learning Problems-Clustering For unsupervised learning and classification

IV	**SYNTACTIC PATTERN RECOGNITION**: Overview of Syntactic Pattern Recognition-Syntactic recognition via parsing and other grammars–Graphical Approaches to syntactic pattern recognition-Learning via grammatical inference.	
V	**NEURAL PATTERN RECOGNITION**: Introduction to Neural Networks-Feed-forward Networks and training by Back Propagation-Content Addressable Memory Approaches And Unsupervised Learning in Neural PR	
	Total Hours	**75 HOURS**

Text book	
1	Robert Schalk off, ―Pattern Recognition: Statistical Structural and Neural Approaches, John Wiley sons.
2	Duda R.O., P.E. Hart & D. G Stork, ―Pattern Classification‖,2nd Edition, Wiley.
3	DudaR.O.&Hart P.E., ―Pattern Classification and Scene Analysis‖,J.wiley.
4	Bishop C.M.,-Neural Networks for Pattern Recognition‖, Oxford University Press.
Reference Books	
1.	1.EarlGose, Richard Johnson bough, SteveJost,―Pattern Recognition and Image Analysis‖, Prentice Hall of India, Pvt Ltd, New Delhi.
Web Resources	
1.	https://www.geeksforgeeks.org/pattern-recognition-introduction/
2.	https://www.mygreatlearning.com/blog/pattern-recognition-machine-learning/

Mapping with programme outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	L	L	L	L
CO2	S	S	S	M	M	L	L	L	L	L
CO3	S	S	S	M	M	S	S	M	L	L
CO4	S	S	S	S	M	S	M	L	L	L
CO5	**S**	**S**	**M**	**L**	**M**	**M**	**L**	**L**	**L**	**L**

*** S-Strong M- Medium L - Low**

SEMESTER-V

Course Code	23UDCF05	LINUX SYSTEM ADMINISTRATION	L	T	P	C
Core/Elective/Supportive		Core:	5	1	0	5
Pre - requisite						

Course Objectives

1. To introduce the concepts of Linux operating system
2. To explain the various constructs associated with Linux
3. To create and managing users, creating and maintaining file systems,
4. To know about various security measures and performing software installation and package management.
5. To learn about Configuring file sharing with NFS

Expected Course Outcomes		
CO1	Illustrate the various directories and file commands in Linux	K1 TO K6
CO2	Explain the methods of securing files in Linux	
CO3	Apply the various commands of Linux	
CO4	Performing maintenance on file systems	
CO5	Identifying and managing Linux processes	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	INTRODUCTION TO LINUX	15 Hours

Introduction to LINUX Operating System: Introduction - The LINUX Operating System - Basic commands in Linux

UNIT II	MANAGING FILES AND DIRECTORIES	15 Hours

Managing Files and Directories: Introduction – Directory Commands in LINUX – File Commands in LINUX. Creating files using the vi editor: Text editors – The vi editor. Managing Documents: Locating files in LINUX – Standard files – Redirection – Filters – Pipes.

UNIT-III	SHELL SCRIPT	15 Hours

Securing files in LINUX: File access permissions – viewing File access permissions – Changing File access permissions. Automating Tasks using Shell Scripts: Introduction – Variables- Local and Global Shell variables – Command Substitution.

UNIT -IV	CONDITIONAL & LOOPING STATEMENTS	15 Hours

Using Conditional Execution in Shell Scripts: Conditional Execution – The case…esac Construct. Managing repetitive tasks using Shell Scripts: Using Iteration in Shell Scripts – The while construct – until construct – for construct – break and continue commands – Simple Programs using Shell Scripts.

UNIT- V	KERNEL & SYSTEM RECOVERY	15 Hours

Linux Kernel- Kernel Components- compiling a kernel- Customizing a kernel – system startup- Customizing the boot process-System Recovery	
Total Lecture Hours	**75 Hours**

	Text Book(s)	
1	Operating System LINUX, NIIT, PHI, 2006, Eastern Economy Edition.	
	REFERENCE BOOKS:	
1	Richard Petersen, Linux: The Complete Reference, Sixth Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, Edition 2008.	
2	Linux system programming, Robert love,2013,	
3	How linux works, brain ward,2nd edition,2014	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	https://onlinecourses.swayam2.ac.in/aic20_sp05/preview	
2	https://archive.nptel.ac.in/Harddisk/local_server.html	
3	https://nptel.ac.in/courses/106105084	

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	M	M	L	L	L
CO2	S	S	S	M	M	S	L	L	L	L
CO3	S	S	M	S	M	S	M	M	L	L
CO4	S	S	S	S	M	M	M	L	L	L
CO5	S	S	S	S	M	M	M	L	L	L

S-Strong M-Medium L-Low

Course Code	23UDCFP05	LINUX SYSTEM ADMINISTRATION LAB	L	T	P	C
Core/elective/Supportive			-	-	3	3
Pre - requisite						

Course Objectives

1. To create directory how to change and remove the directory.
2. To evaluate the concept of shell scripting programs by using an AWK and SED commands
3. To demonstrate the basic knowledge of Linux commands and file handling utilities by using Linux shell environment
4. To Understanding the components for setting up a LAMP server
5. To Implementing basic security measures

Expected Course Outcomes		
CO1	Study all the Basic commands.	K1 TO K6
CO2	Practice the usage of shell script for system configuration.	
CO3	Apply various effects piping and redirection process.	
CO4	Performing backups and restoration of files	
CO5	Working with system log files	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

	TITLE	
1	Write a shell script to stimulate the file commands: rm, cp, cat, mv, cmp, wc, split, diff	
2	Write a shell script to show the following system configuration: i)Currently logged user and his log name. ii)Current shell, home directory, Operating System type, current Path setting, current working directory. iii)Show currently logged number of users, show all available shells iv)Show CPU information like processor type, speed v)Show memory information	
3	Write a Shell Script to implement the following: pipes, Redirection and tee commands.	
4	Write a Shell script for displaying current date, user name, file listing and directories by getting user choice	
5	Write a Shell script to implement the filter commands.	
6	Write a Shell script to remove the files which has file size as zero bytes.	
7	Write a Shell script to find the sum of the individual digits of a given number	
8	Write a Shell script to find the greatest among the given set of numbers using command line arguments.	
9	Write a Shell script for palindrome checking.	

10	Write a Shell script to print the multiplication table of the given argument using for loop	
	Total Practical Hours	**60 Hours**

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	M	M	L	L	L
CO2	S	S	S	M	M	S	L	L	L	L
CO3	S	S	M	S	M	S	M	M	L	L
CO4	S	S	S	S	M	M	M	L	L	L
CO5	S	S	S	S	M	M	M	L	L	L

S-Strong M-Medium L-Low

Course Code	23UDCF06	TOOLS AND TECHNIQUES FOR DIGITAL AND CYBER FORENSIC	L	T	P	C
Core/elective/Supportive		Elective - I	5	1	0	4
Pre - requisite		• Basic knowledge about the crime and law.				

Course Objectives

1. To Explain the origins of forensic science
2. To Explain the difference between scientific conclusions and legal decision-making
3. To Explain the role of digital forensics and the relationship of digital forensics to traditional forensic science, traditional science and the appropriate use of scientific methods
4. To Outline a range of situations where digital forensics may be applicable
5. To Identify and explain at least three current issues in the practice of digital forensic investigations.

Expected Course Outcomes		
CO1	Acquire knowledge of various digital forensic tools	K1 TO K6
CO2	Interpret security issues in Information communication Technology (ICT) world, and apply digital forensic tools for security and investigations.	
CO3	Achieve adequate perspectives of digital forensic investigation in various applications devices like Windows/Unix system, mobile, email etc	
CO4	Generate legal evidences and supporting investigation reports.	
CO5	Outline a range of situations where digital forensics may be applicable	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	Digital Investigation	**14 Hours**
Introduction 1.1 Objectives 1.2 Why Investigate?-Internet Usage Exceeds Norms -Inappropriate E-mail -Theft of Infonnation-Violation of Security Parameters -Intellectual Property Infraction - Electronic Tampering -Establishing a Basis or Justification to Investigate- Determine the Impact of Incident -Whom to Call/Contact- If You are the Auditor Investigator - Understanding Digital Forensics -Applying Scientific Methods to Digital Forensics - Digital Investigation and Evidence - Digital Crime Scene Investigation Process -General Guidelines-Data Analysis - Overview of Toolkits		
UNIT II	Data Acquisition and Information Gathering	**14 Hours**
Data Acquisition - Why Collect Evidence? - Collection Options -Obstacles -Types of Evidence -The Rules of Evidence -Volatile Evidence -General Procedure -Collecting and Archiving -Methods of Collection –Artifacts-Collection Steps		
UNIT-III	Forensic Examination of Systems	**15 Hours**
Search Techniques - Manual Browsing - Keyword Search - Regular Expression Search - Approximate Matching Search - Custom Search - Search Modifications - Reconstruction of Events - Log File Analysis - Determining Temporal Order with Timestamps - File System Analysis - Detection of Deleted Files - File Attributes Analysis - Restoration of a Directory from a Backup - Exploit		

compilation, Running and Deletion - Moving a File - Reconstruction of Deleted Files - Keyword Search - Preparation - Creating Your Master List - Preliminary Evaluation and Client Input - Competitive Analysis - Recursive Term Expansion - Keyword Research Tools - Keyword Analysis: Interpreting the Results		
UNIT - IV	Data Recovery	**16 Hours**
Salvaging Deleted Data - Deleted Files and Folders - File Carving - Handling Special Files - Extracting Embedded Metadata - Using Data From Data Files - File Storage Media - File Systems - Other Data on Media - Collecting Files - Copying Files from Media - Data File Integrity - File Modification, Access and Creation Times - Examining Data Files - Locating the Files -Extracting the Data Encryption and Steganography		
UNIT- V	Forensic Examination of Network Devices	**16 Hours**
Intrusion Detection Systems - Definition of Intrusion Detection -Vulnerability Assessment - Network Security Management - Trust and Intrusion Detection - System Security Management: A Process view - Intrusion Detection Systems and Related Technologies - Firewall Security Systems - Firewall - Reasons for Firewalls - Need for Firewalls - Benefits of Firewalls-Why Firewalls aren't Enough? - Controlled Access to Site Systems -Concentrated Security - Routers - Initial Steps - Common Router Attacks - Procedure for Collecting Volatile and Non-volatile Data - Switches - Switch Concepts - Advantages over Hubs - Volatile and Non-volatile Data Collection Procedures - Wireless Access Points.		
Total Lecture Hours		**75 Hours**
Text Book(s)		
1	Mr. SushiI K Ocean Technocrats Noida “digital forensic -Tools and techniques “Ms. Urshla Kant Assistant Professor, School of Vocational Education & Training, IGNOU	
	REFERENCE BOOKS:	
1	Tools For Cyber Forensics **July 2022** Authors: Peter Baafi	
	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)	
1	https://onlinecourses.swayam2.ac.in/nou21_ge40/preview	
2	https://onlinecourses.swayam2.ac.in/cec20_lb06/preview	

Mapping with programme outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	M	L	L	L	L
CO2	S	S	S	M	M	L	L	L	L	L
CO3	S	S	M	M	M	M	M	L	L	L
CO4	S	S	M	M	M	L	L	M	L	L
CO5	S	S	M	M	M	M	M	L	L	L

*** S-Strong M- Medium L – Lo**

Course Code	23UDCFSE08	Malware Analysis and Cyber Threat Intelligence	L	T	P	F
Core/elective/Supportive		Skill Based	-	1	0	1
Pre - requisite						

Course Objectives

1. To explain about the concept of malware analysis.
2. To Quickly perform a malware autopsy
3. Understand basic yet effective methods for analysing running malware in a safe environment
4. such as virtual machines
5. Understand the basics of the x86 assembly language. Use IDA Pro, the main tool for disassembly analysis.

Expected Course Outcomes

CO1	Explain about the life cycle of Malware and virus nomenclature	K1 TO K6
CO2	Understanding the working principles virus and worms	
CO3	Choose the virus and malware design to perform case studies	
CO4	Analyze the various types of worms and viruses	
CO5	Understand and develop skills in tactical, operational, and strategic-level threat intelligence	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	INTRODUCTION	10 Hours

INTRODUCTION: Computer Infection Program- Life cycle of malware- Virus nomenclature- Worm nomenclature- Tools used in computer virology.

UNIT II	IMPLEMENTATION OF COVERT CHANNEL	11 Hours

IMPLEMENTATION OF COVERT CHANNEL: Non self-reproducing Malware- Working principle of Trojan Horse- implementation of Remote access and file transfer- Working principle of Logical Bomb: CaseStudy: Conflicker C worm

UNIT-III	VIRUS DESIGN AND ITS IMPLICATIONS	11 Hours

VIRUS DESIGN AND ITS IMPLICATIONS: Virus components- Function of replicator, concealer and dispatcher- Trigger -Mechanisms- Testing virus codes- Case Study: Brute force logical bomb.

UNIT -IV	MALWARE DESIGN USING OPEN SOURCE	14 Hours

MALWARE DESIGN USING OPEN SOURCE: Computer Virus in Interpreted programming language- Designing Shell bash virus - under Linux- Fighting over infection- Anti -antiviral fighting - Polymorphism- Casestudy: Companion virus.

UNIT- V	VIRUS AND WORM ANALYSIS	14 Hours

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VIRUS AND WORM ANALYSYS: Klez Virus- Clone Virus- Doom Virus- Black wolf worm- Sassar worm- Happy worm 99

	Total Lecture Hours	60 Hours

Text Book(s)

1	Mark.A .Ludwig, "The Giant black book of computer viruses, Create Space Independent Publishing Platform, 2nd edition, ISBN 10: 144140712X, 2009.
2	ErciFiliol, "Computer Viruses: from theory to applications", Springer, 15tedition, ISBN 1 O: 2-287-23939-1, 2005.

	REFERENCE BOOKS:	
1	Monnappa KA by Learning Malware Analysis: Explore the concepts, tools, and techniques to analyze and investigate Windows malware.	
2	Jessey Bullock ,Wireshark for Security Professionals: Using Wireshark and the Metasploit Framework 1st Edition.	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**	
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**	

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	M	M	L	L	L
CO2	S	S	M	M	M	M	L	L	L	L
CO3	S	S	S	M	M	S	M	L	L	L
CO4	S	S	M	M	M	L	L	L	L	L
CO5	S	S	S	M	M	M	L	L	L	L

*** S-Strong M- Medium L – Low**

Course Code	23UDCFE05	CYBER POLICING	L	T	P	C
Core/elective/Supportive		Elective	5	1	0	4
Pre - requisite		• Basic knowledge about the crime and law.				

Course Objectives

1. To introduce the concept of Cyber policing
2. To Explain about the history of Indian Police
3. To Illustrate the organizational structure and routine activities of police station
4. To Analyze the public perception of police
5. To List the measure to improvise the public perception of police

Expected Course Outcomes

CO1	Explain about the history of Indian Police	K1 TO K6
CO2	Illustrate the organizational structure and routine activities of police station	
CO3	Analyze the public perception of police	
CO4	List the measure to improvise the public perception of police	
CO5	To learn about police organization and structure	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	HISTORY OF INDIAN POLICE	15 Hours

History of Indian Police: Ancient period, Medieval period and British period- Modern policing- Community policing- Police Act, 1861- Police Commission Reforms and Recommendations- National Police Commission recommendations (NPC), 1979

UNIT II	POLICE ORGANIZATION AND STRUCTURE	15 Hours

State police organization and structure - Urban and rural policing- Hierarchy in city police, district police and police battalion- Functioning of State Police: Law and Order, Intelligence and Special Unit- Central police organizations: RAW, 18, NIA, CBI, CISF, CRPF, RPF- Police research and Crime Statistics Organizations: BPR&D, NCRB.

UNIT-III	CRIME PREVENTION	15 Hours

Crime prevention: Patrolling, beat, surveillance, traffic regulation and maintenance of law & order- Collection of intelligence and its use- Use of scientific methods to tackle crime- Examination of crime scene and investigation- Methods of Investigation: Information, Modus Operandi and Interrogation, Recording of FIR, Case Diary, NC register, Collection of Evidence, Examination of Witnesses and Suspects, Confession of the accused and filing of charge Sheet.

UNIT -IV	POLICE STATION ROUTINE	15 Hours

Police Station Routine: Roll Call, Duties of Prevention of Crime, Station Guards, Weekly routine duties of police men in cities and villages- Records maintained in police stations: General Diary, KO register, Prisoners Search Register, Duty Roaster, Sentry Relief Book, Duty Roster, Gun license register, Tapal register, arrest card and bail bond- new challenges faced by police: Cybercrime, financial frauds, terrorists, coastline security and organized

UNIT- V	PUBLIC PERCEPTION OF POLICE	15 Hours

Public perception of police - Measures to improve police image in urban and rural areas- Measurements to improve police-public relationship through community policing- Measures to tackle corruption - Treatment of victims and offender by the police- Camballin to prevent drug abuse and to ensure safety of women in cities

Total Lecture Hours		**75 Hours**
Text Book(s)		
1	Aleem, S. (1991). Women in Indian police (15th ed.). Chicago: Sterling Publishers Private Limited.	
2	Barker, M., &Petley, J. (2001). Ill effects: The media/violence (2nd Ed.). London: Routledge Belson.	
3	Fisher, Barry A. J. (2000). Techniques of crime scene investigation (6th Ed ..). New York: CRC Press	
	REFERENCE BOOKS:	
1	Diaz, S. M. (1976). New dimensions to the oolice role and functions in India. Hyderabad: National Police Academy.	
2	Gautam, D. N. (1993). The Indian police: A study in fundamentals. New Delhi: Mittal Publications.	
	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc.)	
1	**https://onlinecourses.swayam2.ac.in/aic20_sp06/preview**	
2	**https://onlinecourses.swayam2.ac.in/arp19_ap79/preview**	

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	S	S	L	L	L
CO2	S	S	S	M	L	S	S	S	L	L
CO3	S	S	M	M	L	S	S	L	L	L
CO4	S	S	S	M	M	S	S	M	L	L
CO5	S	S	M	M	L	S	S	L	L	L

*** S-Strong M- Medium L – Low**

Course Code	23UDCFE06	DNA TYPING IN FORENSIC	L	T	P	C
Core/elective/Supportive		Elective - I	5	1	0	4
Pre - requisite		• Basic knowledge about the crime and law.				

Course Objectives

1. After studying this paper, the students will know.
2. The basic principle of DNA analysis.
3. The forensic significance of DNA typing.
4. The importance of short tandem repeats and restriction fragment length polymorphism in DNA technique.
5. Role of DNA typing in parentage testing.

Expected Course Outcomes

CO1	Understand about the code of criminal procedure with hierarchy of judiciary	K1 To K6
CO2	Remember the constitution of India and perspectives	
CO3	To understand the concept of bail and Fair trial	
CO4	Analyze the evidence of the criminal cases with cross examination	
CO5	Point out the evidence and ask punished based the evidence	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	15 Hours

DNA as biological blueprint of life - Extraction of DNA for analysis - Quantitation of DNA – yield gel quantitation and slot blot quantitation. Mitochondrial DNA – sequence analysis.

UNIT II	15 Hours

Collection of specimens. Polymerase chain reaction – historical perspective, sequence polymorphisms, individualization of evidence. Short tandem repeats (STR) – role of fluorescent dyes, nature of STR loci. Restriction fragment length polymorphism (RFLP) – genetic markers used in RFLP, typing procedure and interpretation of results. Touch DNA.

UNIT-III	15 Hours

Principles of heredity. Genetics of paternity. DNA testing in disputed paternity. Mendelian laws of parentage testing. Mathematical basis of parentage identification. Missing body cases. Reference populations and databases.

UNIT -IV	15 Hours

Allele frequency determination. Hardy-Weinberg law. Probability determination in a population database

UNIT- V	15 Hours

To carry out the separation of amino acids by thin layer chromatography. To carry out extraction of DNA from body fluids. To preparation of gel plates for electrophoresis. To carry out electrophoresis for separation of enzymes. To prepare a report on the role of DNA typing in solving paternity disputes.

Total Lecture Hours	75 Hours

Text Book(s)

1	1. J.M. Butler, Forensic DNA Typing, Elsevier, Burlington (2005).
2	2. K. Inman and N. Rudin, An Introduction to Forensic DNA Analysis, CRC Press, Boca
	REFERENCE BOOKS:

1	H. Coleman and E. Swenson, DNA in the Courtroom: A Trial Watcher's Guide,	
2	Gene Lex Corporation, Washington (1994).	
	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)	
1	https://pubmed.ncbi.nlm.nih.gov/9210153/	
2	https://onlinecourses.swayam2.ac.in/cec20_lb06/preview	
3	https://pubmed.ncbi.nlm.nih.gov/7879769/	

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	M	M	L	L	L	L
CO2	S	S	S	M	M	L	L	L	L	L
CO3	S	S	M	M	M	M	M	L	L	L
CO4	S	S	M	M	M	L	L	M	L	L
CO5	S	S	S	M	M	M	L	L	L	L

*** S-Strong M- Medium L – Low**

Course Code	23UDCFE07	CRIMINAL PROCEDURE AND EVIDENCE	L	T	P	C
Core/elective/Supportive		Elective - I	5	1	0	4
Pre - requisite		• Basic knowledge about the crime and law.				

Course Objectives

1. To under the Phenomenon knowledge about crime with several disciplines from several perspectives and methodologies.
2. To Understand about the code of criminal procedure with hierarchy of judiciary
3. To Remember the constitution of India and perspectives
4. To understand the concept of bail and Fair trial
5. To Analyze the evidence of the criminal cases with cross examination

Expected Course Outcomes

CO1	Understand about the code of criminal procedure with hierarchy of judiciary	K1 To K6
CO2	Remember the constitution of India and perspectives	
CO3	To understand the concept of bail and Fair trial	
CO4	Analyze the evidence of the criminal cases with cross examination	
CO5	Point out the evidence and ask punished based the evidence	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	ORIGIN	14 Hours

Origin of Criminal Procedure, definitions under Code of Criminal Procedure, 1973 – Hierarchical organization of judiciary in India – Constitution of criminal courts and officers – Jurisdiction and powers of criminal courts –Court of Sessions – Judicial magistrates – Executive magistrates – Public Prosecutors – Informal courts (NyayaPanchayat and LokAdalats)

UNIT II	PRE-TRIAL PROCESSES	13 Hours

Constitutional perspectives: Organization of police, prosecutor and defense counsel – Arrest: Distinction between cognizable and non-cognizable offences – Warrant and summons – Absconder status – Rights of arrested persons under Cr.P.C and Article 22 (2) of the Constitution of India – Search: General principles of search, search with and without warrant and police search during investigation – Seizure – Constitutional aspects of validity of search and seizure proceedings – Security: Nature and procedures

UNIT-III	TRIAL PROCESSES	14 Hours

Commencement of proceedings: Complaint, inquiry, framing of charges, form and content of charge – Bail: General principles and cancellation of bails – Anticipatory bail – Preliminary pleas to bar trial – Remand – Jurisdiction – Time limitations – Pleas of autrefois acquit and autrefois convict – Fair trial – Concept of fair trial – Presumption of innocence – Venue of trial – Constitutional interpretation of Article 21 as a right to speedy trial – Trial before a Court of Session: Procedural steps and substantiate rights – Accusatorial and inquisitorial systems – Summary trial

UNIT - IV	EVIDENCE IN CRIMINAL CASES	16 Hours

Definitions – Concepts – Fact in issue – Relevant fact – Evidence: Proved, disproved, 35 admissibility and relevancy – Relevant evidence in statement form: Admission confessions, dying declarations and expert opinions – Conspiracy evidence – Approver evidence – Presumptions of law – Presumptions of fact – Burden of proof Examination in-chief – Cross-examination, Andre-examination– Impeaching the credit of the witness.

UNIT- V	JUDGEMENTS	15 Hours

Judgements post-conviction orders in lieu of punishment – Appeals – Reference and revisions– Transfer of criminal cases – Suspension of sentence – Execution – Remission – Commutation of

sentence – Disposal of property – Acquittal – Bonds – Fine – Imprisonment		
Total Lecture Hours		**72 Hours**
Text Book(s)		
1	K.N. ChandrasekharanPillai (Rev.), R.V. Kelkar‟s Criminal Procedure (5th ed., 2008)	
2	K.I. Vibhute (Ed.), Criminal Justice (1st ed., 2004)	
	REFERENCE BOOKS:	
1	Lippman, M athew, Criminal Procedure (2011)	
2	Singer, Richard G., Criminal Procedure II: From Bail to Jail, 2nd ed. (2011)	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	https://onlinecourses.swayam2.ac.in/cec21_lw04/preview	
2	https://onlinecourses.swayam2.ac.in/cec20_ge10/preview	
3	https://onlinecourses.swayam2.ac.in/cec20_ge10/preview	
4	https://onlinecourses.swayam2.ac.in/cec21_lw04/preview	

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	M	M	L	L	L	L
CO2	S	S	S	M	M	L	L	L	L	L
CO3	S	S	M	M	M	M	M	L	L	L
CO4	S	S	M	M	M	L	L	M	L	L
CO5	S	S	M	M	M	L	L	M	S	L

*** S-Strong M- Medium L – Low**

Course Code	23UDCFE08	CRIMINAL LAW AND SPECIAL LAW	L	T	P	C
Core/elective/Supportive		Elective - I	5	1	0	4
Pre - requisite		• Basic of Crime and Indian act				

Course Objectives

1. To understand the basic of criminal law and IPC details.
2. To learn about some special law of the crime.
3. To analyze the general principles of the Criminal law
4. To In-depth study of theories of punishment.
5. To Analyzing judicial trends on the rights of the accused.

Expected Course Outcomes

CO1	Understand the elements of Criminal Procedure Code related to forensic science	K1 To K6
CO2	Remember about Acts and provisions of the Constitution of India related to forensic science	
CO3	Understand the Acts of governing socio-economic crimes.	
CO4	Understand the Acts of governing environmental crimes.	
CO5	Expert knowledge in Criminal Jurisprudence.	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	INTRODUCTION TO CRIMINAL LAWS	15 Hours

Introduction to Criminal Laws and Salient Features of Constitution of India Definitions – Vices, sin, tort and crime – History of criminal law – Constitution, Indian Penal Code and Indian Evidence Act – Nature and Scope Constitution of India and its Supremacy – History of Constitution of India – Preamble – Citizenship – Fundamental Rights – Directive Principles of State Policy – Executive, Legislature and Judiciary

UNIT II	SELECTED SECTIONS OF INDIAN PENAL CODE (IPC)	15 Hours

Abetment – Criminal Conspiracy – Offences against the State: Waging or attempting to wage war against the state, Sedition – Offences against public tranquility: Unlawful assembly, rioting and affray – Offences relating to religion – Offences affecting the human body: Murder, suicide, hurt, kidnapping and rape– Offences against Property: Theft, Extortion, Robbery, Dacoity, Forgery, False document, Criminal breach of trust – Offences relating to marriage: Cruelty by husband, bigamy, adultery and defamation – Criminal intimidation – Insult and annoyance

UNIT-III	SELECTED SECTIONS OF CRIMINAL PROCEDURE CODE	14 Hours

Definitions under Code of Criminal Procedure, 1973 – Organizational set up of judiciary in India – Constitution of criminal courts and officers – Jurisdiction and powers of criminal courts – Court of Sessions – Judicial magistrates – Executive magistrates – Public Prosecutors – Informal courts (NyayaPanchayat and LokAdalats) – Complaint – Inquiry – Investigation – Police report – Public

prosecutor – Defense counsel – Arrest – Bail – Search – Seizure – Trialprocesses		
UNIT - IV	**SELECTED SECTIONS OF INDIAN EVIDENCE ACT**	**16 Hours**
Definitions – Concepts – Fact in issue – Relevant fact – Evidence: Proved, disproved, admissibility and relevancy – Relevant evidence in statement form: Admission confessions, dying declarations and expert opinions Conspiracy evidence – Approver evidence – Presumptions of law Presumptions of fact – Burden of proof – Examination in-chief – Cross-examination andre-examination– Impeaching the credit of witness		
UNIT- V	**SPECIAL LAWS**	**15 Hours**
Protection for Children Sexual Offences Act (POCSO), Goondas Act, Civil Rights Protection Act, Protection for Women from Domestic, Narcotic Drugs and Psychotropic Substances Act (NDPS), Human Rights Act, Right to Information Act (RTI).		
Total Lecture Hours		**75 Hours**
Text Book(s)		
1	Vipa P. Sarthi, Law of Evidence, 6th Edition, Eastern Book Co., Lucknow (2006).	
2	(Chief Justice) M. Monir, Law of Evidence, 6th Edition, Universal Law Publishing Co. Pvt. Ltd., New Delhi (2002).	
	REFERENCE BOOKS:	
1	D.A. Bronstein, Law for the Expert Witness, CRC Press, Boca Raton (1999).	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	https://onlinecourses.swayam2.ac.in/cec21_lw04/preview	
2	https://onlinecourses.swayam2.ac.in/cec21_hs08/preview	

Mapping with programme outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	M	M	M	L	L
CO2	S	S	M	M	M	L	L	M	L	L
CO3	S	S	M	L	M	M	M	M	L	L
CO4	S	S	M	L	M	L	L	M	L	L
CO5	S	S	M	L	M	L	L	M	L	L

*** S-Strong M- Medium L - Low**

Subject Code	Subject Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
23UDCFE09	**BIOMETRICS**		2	-	-	-	2	2	25	75	100

Course Objectives

1. Identify the various biometric technologies.
2. Design of biometric recognition.
3. Develop simple applications for privacy
4. Understand the need of biometric in the society
5. Understand the scope of biometric techniques

Course Outcomes		
On completion of this course, students will;		
CO1	To understand the basic concepts and the functionality of The Bio metrics, Face Bio metrics, Types, Architecture and Applications.	K1 TO K6
CO2	To know the concepts Retina and Iris Bio metrics and Vein and Fingerprint Bio metrics.	
CO3	To analyses the Privacy Enhancement and Multi modal Bio metrics.	
CO4	To get analytical idea on Watermarking Techniques	
CO5	To Gain knowledge on Future scope of Biometrics, and Study of various Biometric Techniques.	

	contents	
UNITI	**Introduction**: What is Biometrics, History Types of biometric Traits, General architecture of biometric systems, Basic working of biometric matching, Biometric system error and performance measures, Design of biometric system, Applications of biometrics, Biometrics versus traditional authentication methods. Face Biometrics**:** Introduction, Background of Face Recognition, Design of Face Recognition System Neural Network for Face Recognition, Face Detection Video Sequences, Challenges in Face Biometrics, .7 Face Recognition Methods, Advantages and Disadvantages	6

UNITII	Retina and Iris Biometrics: Introduction, Performance of Biometrics, Design of Retina Biometrics, Design of Iris Recognition System, Iris Segmentation Method , Determination of Iris Region, Determination of Iris Region, Applications of Iris Biometrics, Advantages and Disadvantages.Vein and Fingerprint Biometrics: Introduction, Biometrics Using Vein Pattern of Palm, Fingerprint Biometrics, Fingerprint Recognition System, Minutiae Extraction, Fingerprint Indexing, Experimental Results, Advantages and Disadvantages.	6
UNITIII	Privacy Enhancement Using Biometrics: Introduction, Privacy Concerns Associated with Biometric Deployments, Identity and Privacy, Privacy Concerns, Biometrics with Privacy Enhancement, Comparison of Various Biometrics in Terms of Privacy, Soft Biometrics. Multimodal Biometrics: Introduction to Multimodal Biometrics, Basic Architecture of Multimodal Biometrics, Multimodal Biometrics Using Face and Ear, Characteristics and Advantages of Multimodal Biometrics, Characteristics and Advantages of Multimodal Biometrics.	6
UNITIV	Watermarking Techniques: Introduction, Data Hiding Methods, Basic Framework of Watermarking, Classification of Watermarking, Applications of Watermarking, Attacks on Watermarks, Performance Evaluation, Characteristics of Watermarks, General Watermarking Process, Image Watermarking Techniques, Watermarking Algorithm, Experimental Results, Effect of Attacks on Watermarking Techniques, Attacks on Spatial Domain Watermarking.	6
UNITV	Scope and Future: Scope and Future Market of Biometrics, Biometric Technologies, Applications of Biometrics, Biometrics and Information Technology Infrastructure, Role of Biometrics in Enterprise Security, Role of Biometrics in Border Security, Smart Card Technology and Biometrics, Radio Frequency Identification (RFID) Biometrics, DNA Biometrics, Comparative Study of Various Biometric Techniques. Biometric Standards: Introduction Standard Development Organizations, Application Programming Interface (API), Information Security and Biometric Standards, Biometric Template Interoperability	6
	Total Hours	30

Text books	
1.	Biometrics: Concepts and Applications by G. R Sinha and Sandeep B.Patil , Wiley,2013
References Books	
1.	Guide to Biometrics by Ruud M.Bolle, Sharath Pankanti, Nalinik.Ratha,AndrewW.Senior,Jonathan H. Connell, Springer2009
2.	Introduction to Biometrics by Anilk.Jain,ArunA.Ross,Karthik Nandakumar
3.	Hand book of Biometrics by Anil K.Jain,Patrick Flynn,ArunA.Ross.
Web Resources	
1.	https://www.tutorialspoint.com/biometrics/index.htm
2.	https://www.javatpoint.com/biometrics-tutorial
3.	https://www.thalesgroup.com/en/markets/digital-identity-and-security/government/inspired/biometrics

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	S	S	L	L	L
CO2	S	S	S	M	L	S	S	S	L	L
CO3	S	S	M	M	L	S	S	L	L	L
CO4	S	S	S	M	M	S	S	M	L	L
CO5	S	S	S	M	M	S	S	M	L	L

*** S-Strong M- Medium L - Low**

Course Code	23UDCFSE07	FIELD VISIT: - CRIME INVESTIGATION WITH POLICE DEPARTMENT	L	T	P	C
Core/elective/Supportive		Supportive	-	-	-	2
Pre – requisite		• Basic skills about the crime scene				

Course Objectives

1. To understand real scenario of the crime.
2. To know the investigation procedure.
3. To beginning of the course covers the basic issues of criminal investigation which involves organization, effectiveness, history, and design.
4. To cover issues that is unique to the investigation of particular types of crimes.
5. To focusing on the documentation of evidence, presentation and outcomes of evidence in court, and the future of criminal investigations.

Expected Course Outcomes

CO1	Understand the crime scene procedure to collect the evidence.	K1 TO K6
CO2	Evaluate the evidence found from the crime spot.	
CO3	Analyze the evidence with various methodologies and procedures.	
CO4	Create a questionnaire as per the crime and evidence	
CO5	Understand the threats to not properly effectively, efficiently, and legally conducting criminal investigations	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

AIM OF THE COURSE

The purpose of this field visit (core paper) is to bridge the theoretical fundamentals with that of actual practice and to inculcate a spirit of inquiry & research rigor to investigate the shades that go into the working place. Apart from adapting as team investigation, students are expected to gather, filter the required information and prepare the report in a standardized format of the case.

PROCESS

Colleges are encouraged to institute MoU/ collaborative initiative with firms organization/ government agencies in their juristic / state to get the consent and to make the crime spot visit more purposeful. Every student should do the file visit in a group manner not exceeding five, shall undergo a 2 hours per a week in any police station [city, location to be specified by the respective college] of his/her choice during 6^{th} semester. In case of insufficient hours, college level adjustments can be made to facilitate the student's on training. Prior permission may be obtained from the organization in advance by the students concerned and information shall be passed onto the colleges thus enabling the training supervision by the concerned faculties authorized by the college. Monthly electronic reporting should be obtained to ensure coherent and comprehensive in the progression of the field visit.

A final report [Field Visit Record – FVR] contains the following things.

1. Crime basic details [person details, location mention in xxxxx, yyyy format]
2. Evidence [which found in the crime spot]
3. Methodology [procedure adopting to prove the evidence]

4. Questionnaire preparation [for investigation]

The report shall be prepared not exceeding 30 [A4] pages [pre-printed record designed for this purpose].

INTERNAL PROCEDURE

- Compliance of the procedure (permission seeking from college and police station, informing in advance, monthly reporting and FVR submission) 15 marks
- Structure and Monthly review of FVR 10 marks

EVALUATION PROCEDURE

- There shall be a university-approved comprehensive viva-voce examination at the end of fifth semester. Students shall maintain a [Field Visit Record – ITR] individually for the purpose of the oral examinations.
- FVR shall also be evaluated jointly internal with an external examiner during the viva- voce examination.
- The total mark of 50 for the skill enhancing field visit (core subjects)shall be divided between internal and external evaluations and it is 25 and 25 marks respectively.

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	S	S	L	L	L
CO2	S	S	S	M	L	S	S	S	L	L
CO3	S	S	M	M	L	S	S	L	L	L
CO4	S	S	S	M	M	S	S	M	L	L
CO5	S	S	S	M	M	S	S	M	L	L

*** S-Strong M- Medium L - Low**

SEMESTER VI

Course Code	23UDCF08	CYBER CRIME INVESTIGATION AND DIGITAL FORENSICS	L	T	P	C
Core/elective/Supportive			2	1	0	2
Pre – requisite		• Basic knowledge about computer system				

Course Objectives

1. To provide a knowledge about computer system architecture.
2. To provide a knowledge about investigation with digital data.
3. To Understand the case studies at the beginning of each chapter that can be used to analyze
4. How evidence is (or could be) used to establish proof and to evaluate investigative procedures;
5. Identify strengths and weaknesses of all major forms of evidence, from DNA to other forms of Physical evidence to eyewitness identifications to confessions to behavioral evidence and everything in between;

Expected Course Outcomes

CO1	Remember about computer structure	K1 TO K6
CO2	Understand architecture of the file storage in the computer system.	
CO3	Examine the computer crimes and security firewall	
CO4	Analyze the seized material data.	
CO5	Create a questionnaire as per the crime and evidence	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	BASIC OF COMPUTER SYSTEM	15 Hours

Fundamentals and Concepts Fundamentals of computers Hardware and accessories – development of hard disk, physical construction, CHS and LBA addressing, encoding methods and formats. Memory and processor, Methods of storing data, Operating system, Software. Introduction to network, LAN, WAN and MAN.

UNIT II	COMPUTER CRIMES	15 Hours

Computer Crimes definition and types of computer crimes, Distinction between computer crimes and conventional crimes, Reasons for commission of computer crimes, Breaching security and operation of digital systems.

UNIT-III	COMPUTER VIRUS, AND COMPUTER WORM	15 Hours

Trojan horse, trap door, super zapping, logic bombs. Types of computer crimes – computer stalking,

pornography, hacking, crimes related to intellectual property rights, computer terrorism, hate speech, private and national security in cyber space. An overview of hacking, spamming, phishing and stalking.		
UNIT -IV	**COMPUTER FORENSICS**	**15 Hours**
Computer Forensics Investigations: Seizure of suspected computer, Preparation required prior to seizure, Protocol to be taken at the scene, Extraction of information from the hard disk.		
UNIT- V	**INVESTIGATION METHODS**	**15 Hours**
Treatment of exhibits. Creating bit stream of the original media, Collection and seizure of magnetic media, Legal and privacy issues, Examining forensically sterile media, Restoration of deleted files, Password cracking and E-mail tracking, Encryption and decryption methods, Tracking users.		
	Total Lecture Hours	**75 Hours**

	Text Book	
1	Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2003.	
2	Nelson, Phillips, Enfinger, Steuart, "Computer Forensics and Investigations", Cengage Learning, India Edition, 2008.	
	REFERENCE BOOKS:	
1	John R.Vacca, "Computer Forensics", Cengage Learning, 2005	
2	MarjieT.Britz, "Computer Forensics and Cyber Crime": An Introduction", 3rd Edition, Prentice Hall, 2013.	
	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)	
1	https://onlinecourses.swayam2.ac.in/cec20_lb06/preview	
2	https://onlinecourses.swayam2.ac.in/cec21_ge10/preview	

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	M	M	M	L	L	L
CO2	S	S	S	M	L	M	L	L	L	L
CO3	S	S	M	M	L	M	L	L	L	L
CO4	S	S	S	M	L	L	L	L	L	L
CO5	S	S	S	M	L	L	L	L	L	L

*** S-Strong M- Medium L - Low**

Course Code	**23UDCFE08**	**DIGITAL FORENSICS LAB**	**L**	**T**	**P**	**C**

Core/elective/Supportive		-	-	4	3
Pre - requisite	• Basic knowledge about computers and hardware				

Course Objectives

1. To provide knowledge about cyber forensic investigation process, incident response process, forensic
2. To Discuss the rules, laws, policies, and procedures that affect digital forensics;
3. To Perform the steps included in a digital investigation from the initial recognition of an incident through the steps of evidence gathering, preservation and analysis, and the completion of legal proceedings;
4. To Write professional quality reports that include both a summary report and a notes section, which describes the technical procedures used in the investigation;
5. To Identify important file metadata and apply their use in a forensic investigation;

Expected Course Outcomes

CO1	Understand the evidence of computer forensics	K1 TO K6
CO2	Demonstrate the various procedure against the collected digital evidence	
CO3	Finding the slack and MBR disk space form small disk	
CO4	Analyze the disk space and type of the formatting the disk	
CO5	Perform a forensic investigation on a forensic image, using various tools to recover evidence, resulting in a report documenting the investigation	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

1. Identification, Seizure, Search of Digital media.
2. Evidence Collection and image creation from the evidence.
3. Demonstration of various Forensic tools like Partition magic, Encase etc.
4. Data Recovery, Deleted File Recovery viewing small Disk.
5. Viewing small disk MBR and Slack.
6. Demonstration of Concealment Techniques (Cryptography PGP).
7. Demonstration of Concealment Techniques (Stenography).
8. Demonstration of other Concealment Techniques.
9. Formatting NTFS and EX2, EX3.
10. Case study of Biometric Techniques.

Total Practical Hours | **60 Hours**

Text Book(s)

1	Incident Response and Computer Forensic by Kelvin Mandia, McGraw-Hill Education; 3rd edition (August 1, 2014)
2	Cyber Forensic by Marecella Menendez, John Wiley & Sons (15 May 2012)
	REFERENCE BOOKS:
1	Cyber Forensic A Field Manual for Collecting, Examining and Preserving Evidence of Computer

	Crimes by Albert Marcella, Jr., Doug Menendez,CRC Press 2nd Edition 2007	
	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)	
1	https://nptel.ac.in/courses/106/106/106106178/	
2	https://onlinecourses.swayam2.ac.in/cec20_lb06/preview	

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	M	M	M	L	L	L
CO2	S	S	S	M	L	M	L	L	L	L
CO3	S	S	M	M	L	M	L	L	L	L
CO4	S	S	S	M	L	L	L	L	L	L
CO5	S	S	S	M	L	L	L	L	L	L

*** S-Strong M- Medium L - Low**

									Marks

Subject Code	Subject Name		L	T	P	S			CIA	External	Total
23UDCF09	NETWORK SECURITY		5	-	-	-	4	5	25	75	100

Course Objectives
1. To familiarize on the model of network security, Encryption techniques
2. To understand the concept of Number Theory, theorems
3. To understand the design concept of cryptography and authentication
4. To develop experiments on algorithm used for security
5. To understand about virus and threats, firewalls, and implementation of Cryptography

Course Outcomes		
Course Outcomes	On completion of this course, students will be able to	
CO1	Analyze and design classical encryption techniques and block ciphers.	K1 TO K6
CO2	Understand and analyze public-key cryptography, RSA and other public-key cryptosystems such as Diffie-Hellman Key	
CO3	Understand key management and distribution schemes and design User Authentication	
CO4	Analyze and design hash and MAC algorithms, and digital signatures.	
CO5	Know about Intruders and IntruderDetection mechanisms, Types of Malicious software,	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT	Details	No. of. Hours

I	Model of network security – Security attacks, services and attacks –OSI security architecture –Classical encryption techniques–SDES–Block cipher Principles DES–Strength of DES–Block cipher design principles–Block cipher mode of operation –Evaluation criteria for AES – RC4 - Differential and linear cryptanalysis–Placement of encryption function –traffic confidentiality.	15
II	Number Theory–Prime number–Modular arithmetic–Euclid‘s algorithm-Fermet‘s and Euler‘s theorem – Primarily –Chinese remainder theorem–Discrete algorithm–Public key cryptography and RSA –Key distribution –Keymanagement–Diffie Hellman key exchange–Elliptic curve cryptography	15
III	Authentication requirement–Authentication function–MAC–Hash function–Security of hash function and MAC–SHA-HMAC–CMAC-Digital signature And authentication protocols–DSS.	15
IV	Authentication applications –Kerberos–X.509Authentications services-E-mail security–IP security-Web security	15
V	Intruder – Intrusion detection system – Virus and related threats–Counter measures–Firewalls design principles–Trusted systems–Practical implementation of cryptography and security	15
	Total	75

Text Books:	
1.	William Stallings,–Cryptography & Network Security**,** Pearson Education, Fourth Edition 2010.
References Books:	
1.	Charlie Kaufman, Radia Perlman, Mike Speicher,–Network Security, Private communication in public world, PHI Second Edition,2002
2.	Bruce Schneier, Neils Ferguson,–Practical Cryptography**,** Wiley Dream tech India Pvt Ltd ,First Edition,2003.
3.	Douglas RSimson–Cryptography– Theory and practice, CRCPress,First Edition,1995

Web Resources

1.	https://www.javatpoint.com/computer-network-security
2.	https://www.tutorialspoint.com/information_security_cyber_law/network_security.htm
3.	https://www.geeksforgeeks.org/network-security/

Mapping with programme outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	S	M	M	M	L	L	L
CO2	S	S	S	M	L	M	L	L	L	L
CO3	S	S	M	M	L	M	L	L	L	L
CO4	S	S	S	M	L	L	L	L	L	L
CO5	S	S	S	M	L	L	L	L	L	L

*** S-Strong M- Medium L - Low**

Course Code	23UDCFE07	WILDLIFE FORENSIC	L	T	P	C
Core/elective/Supportive		Elective-II	6	1	0	4
Pre - requisite						

Course Objectives

1. To understand the importance of wildlife.
2. To know the various agencies involved in conservation of wildlife.
3. Understand the national agencies and actors involved in the criminal justice response to wildlife and forest crime, including their mandate and powers
4. Identify criminal offences pertaining to wildlife trafficking, including the elements, interpretation, and application of such offences
5. Understand the methods used to detect and investigate trafficking of wildlife and forest products

Expected Course Outcomes

CO1	Understand the historical context of the development of wildlife conservation, and an understanding of what constitutes wildlife crime.	K1 TO K6
CO2	Understand the significance of international trade in wildlife and a knowledge of the main provisions of CITES	
CO3	Apply various ideas for seizure the evidence	
CO4	Understand the role of wildlife investigation teams	
CO5	Analyze illegal wildlife products, and contribute to the fight against wildlife crime.	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	WILDLIFE FORENSICS	15 Hours

Fundamentals of wildlife forensics. Significance of wildlife forensics. Protected and endangered species of animals and plants. Illegal trading in wildlife items, such as skin, fur, bone, horn, teeth, flowers and plants. Identification of physical evidence pertaining to wildlife forensics. Identification of pug marks of various animals.

UNIT II	FORENSIC ENTOMOLOGY	15 Hours

Forensic Entomology: Basics of forensic entomology. Insects of forensic importance. Collection of entomological evidence during death investigations.

UNIT-III	AGENCIES AND LAW	15 Hours

The list of agencies involved and their function in combating wildlife crime- IUCN, CITES, TRAFFIC, WTI, Wildlife crime Control Bureau, WII, ZSI, CCMB, Institute of wood science and technology, FSL. Wildlife Protection Act.

UNIT-IV	WILDLIFE CRIME SCENE	15 Hours

Search and seizure, documentation, types of evidences found, crime scene sketch, collection and packaging, chain of custody. Forensic Significance. Wildlife investigation team and role of each member.

UNIT- V	GENETICS AND WILDLIFE CONSERVATION	15 Hours

Introduction to Genetics. Species identification, Mitochondrial DNA. Importance of genetics in wildlife protection and conservation. Case elaboration.

	Total Lecture Hours	75 Hours

Text Book(s)

1	Linacre &Tob, Wildlife dna analysis: applications in Forensic science.
2	Jane E. Huffman, John R. Wallace, Wildlife Forensics: Methods and Applications, 1st Edition.
	REFERENCE BOOKS:

1	Wildlife DNA Analysis: Applications in Forensic ScienceByAdrian M. T. Linacre, Shanan S. Tobe 2013	
2	L. Stryer, Biochemistry, 3rd Edition, W.H. Freeman and Company, New York (1988).	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	https://onlinecourses.nptel.ac.in/noc20_bt39/preview	
2	https://onlinecourses.swayam2.ac.in/cec20_bt02/preview	
3	https://wii.gov.in/wildlife_forensic	

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	M	M	L	L	L	L
CO2	S	S	S	M	M	M	L	L	L	L
CO3	S	S	S	S	M	M	M	L	L	L
CO4	S	S	S	M	M	S	L	L	L	L
CO5	S	S	S	M	M	S	L	L	L	L

*** S-Strong M- Medium L – Low**

Course Code	23UDCFE08	CONTEMPORARY CRIMES	L	T	P	C
Core/elective/Supportive		ELECTIVE - II	5	1	0	3
Pre - requisite		• Basic knowledge in crime and society				

Course Objectives

1. To learn about the contemporary crime and the reason for happening of the crimes

2. To provide students with a broad and well-balanced theories and methods of this course.

3. To instill in students an appreciation of the importance of Criminology and Security Studies in Contemporary World Affairs.

4. To cultivate in students the ability to apply their knowledge and skills of the course to the understanding and solution of societal problems in Nigeria and elsewhere.

5. To develop in students a range of useful competencies in employment whether public, private or self employment.

Expected Course Outcomes

CO1	Explore how forensic accounting, practices and forensic audit would enhance fraud prevention and detection in India.	K1 TO K6
CO2	Understand proven that educational level is affecting the effectiveness of use of techniques of fraud prevention and detection.	
CO3	Understand the cybercrime and organized crime with motivations.	
CO4	Apply the knowledge in environmental crime activities and real-life examples.	
CO5	Apply the concept of crime and criminal behavior to understand juvenile delinquency.	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	CYBER CRIME	12 Hours

Cyber Crime: Cyber Crimes and Cyber assisted Crimes – Hacking – Phreaking – Phishing – Online Harassment. Evolution of crimes in social media - Technology and Crime Electronic Monitoring. Cyber Criminology - Cyber Victimology– GPS –Bitcoin – Cryptography- Space Transition theory.

UNIT II	ORGANIZED CRIME	12 Hours

Organized Crime Meaning of organized crime- Racketeering, Contract killings, drug trafficking, corruption, smuggling, extortion, loan sharking, human trafficking, money laundering, bootlegging, arms trafficking, gambling, funding illegally, murder, tax evasion and forger, Sand mafia.

UNIT-III	CORPORATE CRIMES	10 Hours

Meaning of organized crime - White Collar Crime – Mallaya‟s Financial ScandalsPunjab National Bank :Niravmodi‟s Scam - The case of Cognizant Technology Solutions -Saradha Group Financial scandal

UNIT -	ENVIRONMENTAL CRIMES	13 Hours

IV		
Environmental Crimes-Difference between Sanctuary and National Park-UN Environment Programme - The Ministry of Environment, Forest and Climate Change– Indian Forest Service -Wild animal trafficking- electronic waste mismanagement- 45 Indiscriminate logging – Finning - Dumping in rivers and aquifers - Hunting endangered species-Crime Prevention through Environmental Design (CPTED)		
UNIT- V	TERRORISM	**13 Hours**
Meaning of Terrorism and Insurgency, Types of Terrorism, Role of Indian Army, Indian Navy & Indian Air force, National Counter Terrorism Centre, Al- Qaeda- Twin tower attack – Maoist – Naxalites- ISIS – MAFIA-Mumbai Serial Bomb Blasts- Delhi Serial Bomb Blast Godhra train burning-Mumbai Train Blast - Indian Parliament Attack-Coimbatore Bombings, Pulwama attack.		
	Total Lecture Hours	**60 Hours**

Text Book(s)		
1	John S Dempsey: Introduction to Private Security.2007	
2	Clifton L Smith & David J Brooks: Security Science.2012	
	REFERENCE BOOKS:	
1	Mary Kaldor & Lavor Rangelov: The Handbook of Global Security Policy.2014	
2	P.J Ortmeier: Public Safety and Security Administration.2012	
	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc.)	
1	https://onlinecourses.swayam2.ac.in/cec19_hs08/preview	
2	https://onlinecourses.swayam2.ac.in/nou21_hs31/preview	

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	S	S	L	L	L
CO2	S	S	S	M	L	S	S	S	L	L
CO3	S	S	M	M	L	S	S	L	L	L
CO4	S	S	S	M	M	S	S	M	L	L
CO5	S	S	S	M	M	S	S	M	L	L

*** S-Strong M- Medium L – Low**

Course Code	**23UDCF07**	**TECHNOLOGICAL METHODS IN FORENSIC SCIENCE**	**L**	**T**	**P**	**C**

Core/elective/Supportive	ELECTIVE - II	5	1	0	3
Pre - requisite	• Basic knowledge in instrumentation				

Course Objectives

1. To learn the foundations of modern forensic science and the basic principles of forensic instrumental analysis
2. To gain knowledge about various instruments and techniques used in the analysis and examination of evidence.
3. The importance of chromatographic and spectroscopic techniques in processing crime scene evidence.
4. The utility of colorimetry, electrophoresis and neutron activation analysis in identifying chemical and biological materials.
5. The significance of microscopy in visualizing trace evidence and comparing it with control samples.

Expected Course Outcomes		
CO1	Understand the importance of chromatographic	K1 TO K6
CO2	Analyze the evidence through spectroscopic techniques in trace.	
CO3	Apply the skills to visualizing trace evidence through the microscopy	
CO4	Understand the Utility of electrophoresis and in identifying chemical and biological materials	
CO5	The usefulness of photography and videography for recording the crime scenes.	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	GAS CHROMATOGRAPHY	15 Hours

Gas Chromatography: Theoretical principles, instrumentations and technique, columns, stationary phases, detectors, Forensic applications. HPLC: theory, Instrumentation, Technique, column, detectors, LC-MS, Forensic applications.

UNIT II	MICROSCOPY	15 Hours

Microscopy- Types of Microscopes Used in the Forensic Sciences, Stereomicroscope, Compound microscope, Polarizing Light Microscope, Comparison microscope, Electron Microscopy TEM, SEM and their forensic Application

UNIT-III	ELECTROPHORESIS TECHNIQUE	15 Hours

Electrophoresis Technique: General principles, Factors affecting electrophoresis, Sodium dodecyl sulphate(SDS) polyacrylamide gel electrophoresis, Agarose gel electrophoresis, Gel immunodiffusion, Immuno- electrophoresis.

UNIT -	BASIC SPECTROSCOPY	15 Hours

IV		
Basic Spectroscopy-- Introduction, electromagnetic radiations, full range, UV-Visible – principal absorbance, transmittance, Beer-Lambert's laws and its applications of UV-Visible. IR-molecular spectra, electronics, vibrational, rotational spectra. Principles, diagrams, working and construction, uses and applications and IR spectroscopy.		
UNIT- V	**ATOMIC ABSORPTION SPECTROSCOPY**	**15 Hours**
AAS- Introduction, Basic principles, Instrumentation and Techniques, Optical Considerations, The Cold Vapor Mercury Technique, The Hydride Generation Technique, Forensic applications. MASS Spectroscopy- Principle, Instrumentation and working, Forensic applications.		
	Total Lecture Hours	**75 Hours**

Text Book(s)	
1	D.A. Skoog, D.M. West and F.J. Holler, Fundamentals of Analytical Chemistry, 6th edition 1992
2	Concepts, Instrumentation and Techniques in Atomic Absorption Spectrophotometry by Richard D. Beaty and Jack D. Kerber second edition.
	REFERENCE BOOKS:
1	Srivastava Meena, Yadav R. S Principles Of Laboratory Techniques And Methods, 2007.
2	J.W. Robinson, Undergraduate Instrumental Analysis, 5th Edition, Marcel Dekker, Inc., New York (1995).
	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)
1	https://onlinecourses.swayam2.ac.in/cec20_lb06/preview
2	https://onlinecourses.swayam2.ac.in/cec19_cs03/preview

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	M	M	L	L	L
CO2	S	S	S	M	M	S	L	L	L	L
CO3	S	S	M	S	M	S	M	M	L	L
CO4	S	S	S	S	M	M	M	L	L	L
CO5	S	S	S	S	M	M	M	S	L	L

*** S-Strong M- Medium L – Low**

Course Code	23UDCF08	FORENSIC BALLISTICS	L	T	P	C
Core/elective/Supportive		ELECTIVE III			0	1
Pre - requisite		• Basic knowledge in physics law				

Course Objectives

1. To understand the role of the forensic firearm examiner, and introduce the fundamental principles in firearm identification, examination and investigation.
2. To impart the knowledge of firearms and projectile
3. To understand the basics of firearm mechanism
4. To analyses and detect gunshot residue, gunshot powder.
5. To understand class and individual characteristics of firearms and ammunitions.

Expected Course Outcomes

CO1	Understand the classification of firearms and their firing mechanisms.	K1 TO K6
CO2	Understand the methods of identifying firearms methods for characterization of gunshot residue.	
CO3	Analyze the firearm injuries and identify the ammunition.	
CO4	Analyze the firearm evidence	
CO5	Identify the range of fire using modern methods and also different wounds caused by firearms.	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	FIREARMS	10 Hours

Firearms-History and development of firearms. Classification of firearms. Weapon types and their operation. Firing mechanisms of different firearms.

UNIT II	INTERNAL AND EXTERNAL BALLISTICS	14 Hours

Internal ballistics – Definition, ignition of propellants, shape and size of propellants, manner of burning, and various factors affecting the internal ballistics: lock time, ignition time, barrel time, erosion, corrosion and gas cutting. External Ballistics – Vacuum trajectory, effect of air resistance on trajectory, base drag, drop, drift, yaw, shape of projectile and stability, trajectory computation, ballistics coefficient and limiting velocity, Measurements of trajectory parameters, introduction to automated system of trajectory computation and automated management of ballistic data.

UNIT-III	TERMINAL BALLISTICS	11 Hours

Terminal Ballistics – Effect of projectile on hitting the target: function of bullet shape, striking velocity, striking angle and nature of target, tumbling of bullets, effect of instability of bullet, effect of intermediate targets, and influence of range. Ricochet and its effects, stopping power.

UNIT -IV	AMMUNITION	12 Hours

Ammunition - Types of ammunition characteristics of different types of cartridges and bullets. Primers and priming compounds. Projectiles. Head stamp markings on ammunitions. Different types of marks produced during firing process on cartridge – firing pin marks, breech face marks, chamber marks, extractor and ejector marks.

UNIT- V	FIREARM EVIDENCE	13 Hours

Firearm Evidence - Matching of bullets and cartridge cases in regular firearms. Identification of bullets, pellets and wads fired from improvised, country made firearms. Automated method of bullet and cartridge case comparison. Determination of range of fire and time of fire. Mechanisms of formation of gunshot residues. Methods of analysis of gunshot residues from shooting

hands and targets, with special reference to clothings. Identification and nature of firearms injuries		
	Total Lecture Hours	**60 Hours**
Text Book(s)		
1	B.J. Heard, Handbook of Firearms and Ballistics, Wiley and Sons, Chichester (1997).	
2	W.F. Rowe, Firearms identification, Forensic Science Handbook, Vol. 2, R. Saferstein (Ed.), Prentice Hall, New Jersey (1988)	
	REFERENCE BOOKS:	
1	A.J. Schwoeble and D.L. Exline, Current Methods in Forensic Gunshot Residue Analysis, CRC Press, Boca Raton (2000).	
2	E. Elaad in Encyclopedia of Forensic Science, Volume 2, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000)	
	Related Online Contents (MOOC, SWAYAM, NPTEL, Websites etc)	
1	https://onlinecourses.nptel.ac.in/noc20_mm03/preview	
2	http://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000016FS/P000693/M011480/ET/1516189224FSC_P6_M17_e-text.pdf	

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	M	M	L	L	L	L
CO2	S	S	S	M	M	M	L	L	L	L
CO3	S	S	S	S	M	M	M	L	L	L
CO4	S	S	S	M	M	S	L	L	L	L
CO5	S	S	S	M	M	S	L	L	L	L

*** S-Strong M- Medium L – Low**

Course Code	23UDCF09	FORENSIC TOXICOLOGY	L	T	P	F
Core/elective/Supportive		ELECTIVE III	-	1	0	1
Pre - requisite		• Basic knowledge in chemistry and forensic medicine				

Course Objectives

1. To learn the drugs and their implications in a forensic setting.
2. To analysis the drugs level and types of drugs
3. To understand the significance of toxicological studies in forensic science.
4. To know classification of poisons and their modes of actions.
5. To gain knowledge about absorption of poisons in body fluids.

Expected Course Outcomes

CO1	Understand the significance of toxicological studies in forensic science.	K1 TO K6
CO2	Classification of poisons and their modes of actions.	
CO3	Understand the concept of absorption of poisons in body fluids.	
CO4	Classification and characteristics of the narcotics, drugs and psychotropic substances.	
CO5	Understanding of criminal justice systems as they relate to forensic science.	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	BASICS OF TOXICOLOGY	10 Hours

Toxicology: Introduction, Classification of Toxicology, Forensic toxicology.significance of toxicological findings. Techniques used in toxicology. Toxicological analysis and chemical intoxication tests. Postmortem Toxicology.

UNIT II	POISONS	11 Hours

Classification of poisons. Plant poisons, Animal poisons, Metallic Poisons. Physico-chemical characteristics and mode of action of poisons. Accidental, suicidal and homicidal poisonings.Signs and symptoms of common poisoning and their antidotes. Collection and preservation of viscera, blood and urine for various poison cases. Identification of biocides and metal salts in body fluids. Metabolism and excretion of poisons.

UNIT-III	IDENTIFICATION OF TOXINS	11 Hours

Application of immunoassays in forensic work. Animal poisons. Snake venom. Mode of action. Carbon monoxide poisoning. Vegetable poisons. Poisonous seeds, fruits, roots and mushrooms. Beverages. Alcoholic and non-alcoholic illicit liquors. Analysis and identification of ethyl alcohol. Estimation of ethyl alcohol in blood and urine. Proof spirit. Crime scene management in illicit liquor cases.

UNIT -IV	NARCOTICS, DRUGS AND PSYCHOTROPIC SUBSTANCES	14 Hours

Narcotics, Drugs and Psychotropic Substances-Definition of narcotics, drugs and psychotropic substances. Broad classification – Narcotics, stimulants, depressants and hallucinogens. General characteristics and common example of each classification. Drugs and psychotropic substances. Designer drugs. Tolerance, addiction and withdrawal symptoms of narcotics, drugs and psychotropic substance.

UNIT- V	ANALYSIS OF NARCOTICS	14 Hours

Testing of narcotics, drugs and psychotropic substances. Isolation techniques for purifying narcotics, drugs and psychotropic substances – thin layer chromatography, gas-liquid chromatography and high performance liquid chromatography. Presumptive and screening tests for narcotics, drugs and psychotropic substances. Microcrystalline testing of drugs of abuse. Analysis of narcotics, drugs and

psychotropic substances in breast milk, saliva, urine, hair and antemortem blood. Drugs and driving.		
	Total Lecture Hours	**60 Hours**
Text Book(s)		
1	Professor K.S. Narayan Reddy the Essentials Of Forensic Medicine And Toxicology, jaypee Brothers Medical Publishers, 33rd Edition, 2014	
2	Professor V.V. Pillay Textbook Of Forensic Medicine And Toxicology, Paras Medical Publisher, 18th edition (2017)	
	REFERENCE BOOKS:	
1	W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton 8th Edition (2013)	
2	Principles of Forensic Toxicology Barry Levine,Amer. Assoc. for Clinical Chemistry,4th Edition 2014	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	https://onlinecourses.swayam2.ac.in/cec20_bt19/preview	
2	https://dor.gov.in/narcotic-drugs-psychotropic	

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	M	M	L	L	L
CO2	S	S	M	M	M	M	L	L	L	L
CO3	S	S	S	M	M	S	M	L	L	L
CO4	S	S	M	M	M	L	L	L	L	L
CO5	S	S	M	M	M	L	L	L	L	L

*** S-Strong M- Medium L – Low**

Course Code	23UDCF10	WEB APPLICATION SECURITY	L	T	P	F
Core/elective/Supportive		ELECTIVE III	-	1	0	1
Pre - requisite		• Basic knowledge in Web Protection				

Course Objectives

1. To reveal the underlying in web application.
2. To understand the security principles in developing a reliable web application.
3. Common web application security vulnerabilities and how to find them.
4. Approaches to avoid or reduce these vulnerabilities and how they work.
5. The challenges and trade-offs we face when implementing these controls.

Expected Course Outcomes

CO1	Identify the vulnerabilities in the web applications.	K1 TO K6
CO2	Identify the various types of threats and mitigation measures of web applications.	
CO3	Apply the security principles in developing a reliable web application	
CO4	Use industry standard tools for web application security.	
CO5	This course will help you to understand, identify, and avoid common software security vulnerabilities in your code.	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

UNIT – I	**Overview of Web Applications**	**15 Hours**

Introduction history of web applications interface ad structure benefits and drawbacks of web applications Web application Vs Cloud application. Security Fundamentals: Input Validation - Attack Surface Reduction Rules of Thumb- Classi- fying and Prioritizing Threads

UNIT II	**Browser Security Principles**	**15 Hours**

Origin Policy - Exceptions to the Same-Origin Policy - Cross-Site Scripting and Cross-Site Request Forgery - Reflected XSS - HTML Injection

UNIT-III	**Web Application Vulnerabilities**	**15 Hours**

Understanding vulnerabilities in traditional client server application and web applications, client state manipulation, cookie based attacks, SQL injection, cross domain attack (XSS/XSRF/XSSI) http header injection. SSL vulnerabilities and testing - Proper encryption use in web application - Session vulnerabilities and testing - Cross-site request forgery

UNIT -IV	**Web Application Mitigations**	**15 Hours**

Http request , http response, rendering and events , html image tags, image tag security, issue, java script on error , Javascript timing , port scanning , remote scripting , running remotecode, frame and iframe , browser sandbox, policy goals, same origin policy, library import, domain relaxation

UNIT- V	**Secure Website Design**	**15 Hours**

. Secure website design : Architecture and Design Issues for Web Applications, Deployment Considerations Input Validation, Authentication, Authorization, Configuration Management ,Sen- sitive Data, Session Management, Cryptography, Parameter Manipulation, Exception Manage- ment, Auditing and Logging, Design Guidelines, Forms and validity, Technical implementation

Total Lecture Hours	**75 Hours**

Text Book(s)

1	Sullivan, Bryan, and Vincent Liu. Web Application Security, A Beginner's Guide. McGraw Hill Professional, 2011
2	Stuttard, Dafydd, and Marcus Pinto. The Web Application Hacker's Handbook: Finding and

	Exploiting Security Flaws. John Wiley Sons, 2011

	REFERENCE BOOKS:	
1	W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton 8th Edition (2013)	
2	Principles of Forensic Toxicology Barry Levine,Amer. Assoc. for Clinical Chemistry,4th Edition 2014	
	Related Online Contents (MOOC, SWAYAM,NPTEL, Websites etc)	
1	https://onlinecourses.swayam2.ac.in/cec20_bt19/preview	
2	https://dor.gov.in/narcotic-drugs-psychotropic	

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	M	M	L	L	L
CO2	S	S	M	M	M	M	L	L	L	L
CO3	S	S	S	M	M	S	M	L	L	L
CO4	S	S	M	M	M	L	L	L	L	L
CO5	S	S	M	M	M	L	L	L	L	L

*** S-Strong M- Medium L – Low**

Course Code	23UDCF07	Project Work Lab	L	T	P	C
Core/elective/Supportive		Core:12	0	0	5	8
Pre - requisite		Students should have the strong knowledge in forensic evidence data collection, examine procedures.				

Course Objectives

1. Provide an in-depth exploration of a topic of special interest.
2. Acquire knowledge on the chosen topic and apply the knowledge, experience, and skills learned in the Law and Justice programme to the chosen topic.
3. Apply various research techniques, find suitable sources of information, and acknowledge them in the research project.
4. Develop effective communicative skills to present research on Law and Justice Issues.
5. Effectively present and defend your research orally.

Expected Course Outcomes

On the successful completion of the course, student will be able to:

CO1	Understand the independent research on Law and Justice Topics.	K1 To K6
CO2	Create a various investigation idea to finding the evidence	
CO3	Apply the student's various angle on the crime cases.	
CO4	Effectively present and defend your research orally.	
CO5	Produce a thesis of publishable quality.	

K1 – Remember K2 – Understand K3 – apply K4- Analyze K5 – evaluate K6- Create

The Project will be based on a research topic in Forensic Science/Criminology. The topic will be assigned in consultation with police and forensic science establishments, giving due consideration to the problem areas faced by these institutions. The students will be expected to undertake extensive fieldwork, in collaboration with mobile police laboratories. The students will undertake certain projects pertaining to Digital and Cyber Forensics and DNA Analysis. The projects will be assigned in consultation with respective departments experts.

Aim of the project work

1. The aim of the project work is to acquire practical knowledge on the implementation of the forensic concepts studied.
2. Examining evidence from a crime scene using strictly scientific knowledge and principles in order to find facts about a criminal case.
3. Each student should carry out individually one project work and it may be a work using the cyber forensic software packages or DNA typing or Serology, etc.
4. That they have learned, the implementation of concepts from the papers studied, or implementation of any innovative idea focusing on application-oriented concepts.

Viva Voce

1. Viva-Voce will be conducted at the end of the year by both Internal (Respective Guides) and

External Examiners, after duly verifying the Annexure Report available in the College, for a total of 200 marks at the last day of the practical session.

2. Out of 200 marks, 160 marks for project report and 40 marks for Viva Voce.

Mapping with programme outcomes:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	M	M	M	M	L	L	L
CO2	S	S	S	M	M	S	L	L	L	L
CO3	S	S	M	S	M	S	M	M	L	L
CO4	S	S	S	S	M	M	M	L	L	L
CO5	S	S	S	S	M	M	M	L	L	L

S-Strong M-Medium L-Low

Project Work Format

PROJECT WORK

TITLE OF THE DISSERTATION

Bonafide Work Done by

STUDENT NAME

REG. NO.

Dissertation submitted in partial fulfillment of the requirements for the award of
<Name of the Degree>
Of Periyar University, Salem - 11.

College Logo

Signature of the Guide Signature of the HOD
Submitted for the Viva-Voce Examination held on _____

Internal Examiner External Examiner

Month – Year

CONTENTS

Mapping with programme outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	S	M	M	S	S	L	L	L
CO2	S	S	S	M	L	S	S	S	L	L
CO3	S	S	M	M	L	S	S	L	L	L
CO4	S	S	S	M	M	S	S	M	L	L
CO5	S	S	S	M	M	S	S	M	L	L

*** S-Strong M- Medium L – Low**