Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore
Shri Vaishnav Institute of Forensic Science

M.Sc. Cyber Forensics
SEMESTER I (2025 – 2027)

COURSE CODE	CATEGORY	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MSCFN101		Fundamentals of Cyber Forensics	60	20	20	30	20	3	0	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Th. - Theory

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Course Objectives:

The student will have ability:

- To understand digital investigation
- Methods of storing data
- Computer Basics for Digital Investigators

Course Outcomes:

Upon completion of the subject, students will be able to:

- Know the computer crime investigation
- Understanding information related with cyber forensics
- Types of computer forensics tools

Unit 1: Computer Structure, Generations of Computer, Basic Applications of Computer, Componentsof Computer System,Basics of system software and application software**.** Digital Evidence and Computer Crime - History andTerminology of Computer Crime Investigation - Technology and Law - The InvestigativeProcess Investigative Reconstruction - Modus Operandi, Motive and Technology -DigitalEvidence inthe Courtroom.

Unit 2 : Understanding information **-** Methods of storing data: number systems, character codes, record structures, file formats and file signatures - Word processing and graphic file formats - Structure and Analysis of Optical Media Disk Formats - Recognition of file formats and internal buffers - Extraction of forensic artifacts– understanding the dimensions of other latest storage devices – SSD Devices.

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Unit 3:Computer Basics for Digital Investigators - Computer Forensic Fundamentals - Applying Forensic Science to computers - Computer Forensic Services - Benefits of Professional Forensic Methodology -Steps taken by computer forensic specialists.

Unit 4: Standards, Guidelines and Best Practices - Handling the Digital Crime Scene - Digital Evidence Examination Guidelines – ACPO – IOCE – SWGDE - DFRWS – IACIS HTCIA - ISO 27037

Unit 5:
Types of Computer Forensics Tools and Technology -Tools and Types of Military Computer Forensics Technology -Tools and Types of Law Enforcement Computer Forensic Technology -Tools and Types of Business Computer Forensic Technology.

List of Practical's

1. Identifying components of computer
2. Evidence collection from running computer using different tools
3. Imaging of an evidence using different tools
4. Image analysis using different tools
5. Windows registry analysis
6. Analysis of windows artifacts
7. Analysis of USB devices
8. Different password cracking techniques
9. Different steganography techniques
10. Report writing of an incident findings

Reference books

- Computer Forensics: Computer Crime Scene Investigation by John R. Vacca
- Computer Fundamentals by Anita Goel, Pearson India, ISBN: 9788131770948
- Computer Fundamentals: Concepts, Systems & Applications- 8th Edition by PritiSinhaandPradeep Sinha, BPB Publication
- Chad Steel, "Windows Forensics", Wiley, 1st Edition, 2006.
- Robert M Slade, "Software Forensics: Collecting Evidence from the Scene of a Digital Crime",Tata McGraw Hill, Paperback, 1st Edition, 2004.
- Practical windows Forensics by Ayman Shaaban, Konstantin Sapronov

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MSCFN102		Forms of Cyber Crime	60	20	20	30	20	3	0	2	4

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Course Objectives:

The main objectives of this course are to:

1. Understand the basics of Cyber Crime.
2. Forms of Cyber Crimes
3. Profile of Cyber criminals
4. Modus Operandi of various cybercrimes and frauds

Course Outcomes:

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

1. Understand the basics of Cyber Crime.
2. Forms of Cyber Crimes
3. Profile of Cyber criminals
4. Modus Operandi of various cybercrimes and frauds

Unit 1: Cyber Crime – Introduction – History and Development – Definition, Nature and Extent of Cyber Crimes in India and other countries - Classification of Cyber Crimes – - Trends in Cyber Crimes across the world.

Unit 2 :

Forms of Cyber Crimes, Frauds – hacking, cracking, DoS – viruses, works, bombs, logical bombs, time bombs, email bombing, data diddling, salami attacks, phishing, steganography, cyber stalking, spoofing, pornography, defamation.

Unit 3 :

Modus Operandi of various cybercrimes and frauds – Definition of various types of cyber frauds – Modus Operandi - Fraud triangle – fraud detection techniques including data mining and statistical references - countermeasures.

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Unit 4:
Profile of Cyber criminals – Cyber Crime Psychology – Psychological theories dealing with cyber criminals

Unit 5: Cyber Crime Impacts on Society
Impact of cybercrimes – to the individual, to the corporate and companies, to government and the nation

Practical's

1. DoS attack (2 Nos)
2. Email Spamming (2 Nos)
3. Steganography (2 Nos)
4. Cryptography (2 Nos)
5. Password Cracking (2 Nos)
6. Criminological theories in cyber crime investigation (2 Nos)

Reference Books:

- National Cyber Crime Reference Handbook, AICTE, National Cyber Safety and Security Standards, Ministry of Social Justice and Empowerment, MSME, Govt of India.
- Cyber Criminology, Series Editor, Anthony J. Masys, Humanitarian Assistance and Homeland Security, University of South Florida, Tampa, USA, Springer (2018
- Public International Law of Cyberspace - Law, Governance and Technology Series 32,Series editors, Pompeu Casanovas, Giovanni Sartor, Springer (2017)
- Cyber Crime Investigations, Anthony Reyes, Syngress Publishing, Inc (2007).

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			THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MSCFN103		Operating System Forensics	60	20	20	30	20	3	0	2	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit; Th. - Theory

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

Course Objectives:

- To understand operating system
- To understand system memory structure
- To understand mobile operating system

Course Outcomes:

1. Able to understand working of operating system
2. Able to understand memory structure and data recovery
3. Able to understand mobile operating systems.

UNIT I OVERVIEW

Introduction – evolution on operating System - Process management – states – threads –IPC – Memory –types of memory – Management – files system and file handling.

UNIT II FILE SYSTEM AND DATA RECOVERY

Introduction – Disk handling – Booting – boot files- master boot record – Firmware - Files System: Windows, Linux, Apple - Hidden files systems. Data Recovery: Data Carving – searching deleted and sparse files – data-hiding – Time stamping and lines – Volume shadow copies.

UNIT III MEMORY AND SYSTEM CONFIGURATION

Memory: Real, Virtual, and addressing –layout - capturing, analysis –paging and swapping, System Configuration: Windows- Linux-Mac OS X, Tracking Artifacts – Locating - tracking documents and shortcuts.

UNIT IV LOGS AND EXECUTABLE FILES

Log files – windows, UNIX, Application, Mac OS X, Security and Auditing; Executable files: Stacks and heaps - Portable - Files formats – windows, Linux, Apple - CLR and JVM – Debugging – System Calls and tracing

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UNIT V MOBILE OPERATING SYSTEM AND NEWER TECHNOLOGIES Introduction –Android, Blackberry, iOS Windows Mobile; Newer Technologies - Virtualization, Cloud Computing, Wearables, Drones; Report – Writing Style, requirements and considerations.

Practical's

1. Memory Management (2 Nos)
2. Slack Space (2 Nos)
3. Data Recovery (2 Nos)
4. Email Tracking (2 Nos)
5. Linux/Unix Installing and basic commands (2 Nos)
6. Drones data recovery (2 Nos)
7. Mobile Imaging (2 Nos)

Reference Books:

1. William Stallings Operating Systems Internals and Design Principles Ninth Edition By Pearson.
2. Andrew S Tanenbum, Modern Operating Systems, Prentice-Hall of India Pvt.Ltd
3. Richard Petersen, Linux: The Complete Reference, Sixth Edition, McgrawHill.
4. Dhananjay Dhamdhere Operating Systems a Concept Based Approach McGraw Hill Education India
5. Avi Silberschatz, Greg Gagne, and Peter Baer Galvin Operating System Concepts JohnWiley & Sons, Inc.
6. Curt Schimel UNIX Systems for Modern Architectures 3rd edition Addison-Wesley
7. Operating System Forensics, 1st Edition by R Messier Publisher: Syngress; 1 edition (27 November2015)
8. Modern Operating System by Andrew S.Tanenbaum 3rd Edition, Pearson Education.
9. Security Strategies in Linux Platforms and Applications (Information Systems Security &Assurance) by Michael Jang (Sep 3, 2010)

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			THEORY			PRACTICAL		L	T	P	CREDITS
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MSCFN104		Languages in Cyber Forensics	0	0	0	30	20	0	0	4	2

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Course Objectives:

- To write programs using C++.
- To write programs for solving real world problems using java collection frame work.
- To write multithreaded programs.
- To write GUI programs using swing controls in Java.
- To introduce java compiler and eclipse platform.
- To impart hands on experience with java programming.

Course Outcomes:

4. Able To write programs using C++.
5. Able to write programs for solving real world problems using java collection frame work.
6. Able to write programs using abstract classes.
7. Able to write multithreaded programs.
8. Able to write GUI programs using swing controls in Java.

List of experiments

1. Develop various C Programs using Control Structures
2. Develop various C programs using Switch case.
3. Develop a C program to illustrate recursive function.
4. Develop a C program to find the palindrome in each sentence.
5. Develop a C program to manipulate strings using string functions.
6. Develop a C Program using Functions
7. Write a C++ program to find the sum of individual digits of a positive integer.
8. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C++ program to generate the first n terms of the sequence.

9. Write a C++ program to implement the matrix ADT using a class. The operationssupported by this ADT are:a. Reading a matrix.b. Printing a matrixc. Addition of matricesd. Subtraction of matricese. Multiplication of matrices
10. Write C++programs that illustrate how the Single inheritance, Multiple inheritance Multilevel inheritance and Hierarchical inheritance forms ofinheritance are supported.
11. Write a C++program that illustrates the order of execution of constructors and destructorswhen new class is derived from more than one base class
12. Write a C++ program that illustrates how run time polymorphism is achieved using virtualfunctions
13. Use Eclipse or Net bean platform and acquaint with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.
14. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.
15. Develop an applet in Java that displays a simple message. b) Develop an applet in Java that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked.
16. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.
17. Write a Java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

References

1. E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, Second Reprint 2008.
2. Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson, 2002. 2. Henry
   Mullish& Hubert L.Cooper: The Sprit of C, Jaico, 1996.
3. E. Balagurusamy, Object-Oriented Programming with C++, TMH, 1998.
4. Maria Litvin& Gray Litvin, C++ for you, Vikas publication, 2002.
5. John R Hubbard, Programming with C, 2nd Edition, TMH publication,2002
6. Bigus&Bigus, "Constructing Intelligent agents with Java", Wiley, 2010.
7. Bradshaw, "Software Agents", MIT Press, 2012.

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
MSFSN101	DC	Introduction to Forensic Science and Police Administration	60	20	20	30	20	4	0	2	5

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

Course Objectives: The course aims to provide the students with

1. The organizational set up of a Forensic Science Laboratory.
2. The report writing and crime scene Management.
3. The different types of offences and Indian Penal system.
4. The organizational structure of police station and duties of police.

Course Outcomes: After studying this course, the students will

1. Be able to understand organizational set up of a Forensic Science Laboratory.
2. Be able to understand crime scene Management.
3. Be able know Indian Penal Code.
4. Be able to understand structure and duties of police.

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

UNIT II: Crime Scene Management
Crime scene investigations, Protection of Crime Scene, Documentation, sketching, field notes and photography, Searching, handling and collection, preservation and transportation of physical evidences. Chain of custody and Reconstruction of scene of crime, Report writing.

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UNIT III: Criminal Law I

Criminal law: Definition, Basic elements and Purpose. Crime: definition and essential components of crime as stated in criminal law. Difference between criminal law and civil law Indian penal code: Introduction, classification of crime under Indian penal code, Introduction to IPC Sec: - 106,279,302,304A,304B, 309,240,375,376,377, 378,379, 383,384,353,402,354. NDPS Act, Food and Adulteration Act

UNIT IV: Criminal Law II

Criminal Procedure code: Definition and classification of offences under Cr. P.C, Introduction to cognizable / non cognizable, Bailable/non Bailable, Compoundable /non compoundable offence, Cr.P.C. sec 291-293, Summon Case and Warrant cases, F I R, Zero FIR, Indian Evidence Act: section – 3,24- 30,45,135-138. who is known as an expert in law, Difference between the testimony of an expert and an ordinary witness**.**

UNIT V: Police Administration

History and development of police administration, Police duties, responsibilities and powers, Organizational structure of police station, maintenance of crime records and accountability of police to law, NCRB and BPR&D, Custodial deaths, Police and Human Rights.

Practicals:

1. Descriptive study of organizational structure of a forensic science laboratory.
2. Photography of crime scene using manual and digital camera.
3. Basics of crime scene sketching
4. To carry out sketching of indoor crime scene.
5. To carry out sketching of outdoor crime scene.
6. Methods for Searching of physical evidences at scene of crime.
7. Any other related to the course

Suggested Readings:

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

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MSFSN1052	E	Quality Management & Research Methodology	60	20	20	0	0	4	0	0	4

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Course Objectives: The course aims to provide the students with

1. To equip the students with the concept and Methods of Research.
2. To plan and Design Research using Scientific and Statistical Methods.

Course Outcomes: After studying this course, the students will

1. Be able to know the basics of Research
2. Be able to select research problem.
3. Be able to perform basic statistics used in research

Unit I: Quality Management System
Quality Management System: Quality, Total Quality, Quality assurance, Quality Control, Quality Planning, and Quality Audit: Internal and External Audit, Accreditation, NABL, ISO, IEC, BIS. **Technical Requirements for testing and calibration of laboratories**: Test and calibration methods and their validation, measurements, standards and reference material, traceability, sampling.

Unit II: Introduction to Research Methodology
Meaning of Research, Objectives of Research, Types of Research, Significance of Research, Problems Encountered By Researchers In India.
Research problem: Definition, Necessity and Techniques of Defining Research Problem, Research Proposal, Literature Search, Hypothesis, Report Writing.

Unit III:Research Design:
Meaning, Need and Features of Good Research Design, Types of Research Design, Basic Principles of Experimental Designs, Design Of Experiments, Synopsis Design for Research Topic.

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Sampling Design: Sample Design, Census And Sample Surveys, Types Of Sampling Design, Sampling Errors Characteristics Of Good Sample Design.

Unit IV: Descriptive Statistics

Types of Data, Basic Concepts of Frequency Distributions, Measure of Central Tendency, Mean, Median And Mode, Measure of Dispersion, Range, Mean Deviation And Standard Deviation. Correlation and Regression Analysis.

Unit V: Methods of Data Collection

Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaire and Schedules, Other Methods. Collection of Secondary Data, Selection of Appropriate Method For Data Collection, Case Study Method , Guidelines For Developing Questionnaire, Successful Interviewing , Survey V/S Experiment.

Suggested Readings:

1. Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Research Methodology, RBSA Publishers.
2. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, Ess Ess Publications. 2 volumes.
3. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 270p.
4. Wadehra, B.L. 2000. Law relating to patents, trademarks, copyright designs and geographical indications. Universal Law Publishing.
5. Malhotra Naresh K. (2008). Marketing Research. Pearson publishers, Latest Edition.
6. Zikmund, Babin, Carr, Griffin (2003). Business Research Methods. Cengage Learning, India, Latest Edition.
7. Cooper Donald R and Schindler Pamela S. (2006). Business Research Methods. McGraw-Hill Education, Latest Edition. Shri Vaishnav Vidyapeeth Vishwavidyalaya Master of Technology (Computer Science and Engineering) Choice Based Credit System (CBCS)
8. Anderson, Sweeney, William, Cam (2014). Statistics for Business and Economics. Cengage Learning, Latest Edition.
9. Krishnaswami O. R., Ranganatham M. (2011). Methodology of Research in Social Sciences. Himalaya Publishing House, Latest Edition.
10. Levin and Rubin (2008). Statistics for Management. Dorling Kindersley Pvt Ltd, Latest Edition.
11. Sekaran Uma (2003). Research Methods for Business. Wiley India, Latest Edition.
12. Gupta S. P. (2014). Statistical Methods. Sultan Chand and Sons, Latest Edition.
13. Aczel and Sounderpandian (2008). Complete Business Statistics. Tata-McGraw Hill,Latest Edition.
14. Kothari C. R. (2004). Research Methodology. Vishwa Prakashan, Latest Edition.