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

Choice-Based Credit System (CBCS)
B. Sc. Digital and Cyber Forensics- Batch (2024-28)
SEMESTER- IV

COURSE CODE	CATEGORY	COURSE NAME	THEORY			PRACTICAL		L	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BDCF401	Major	Forensic Audio-Video Analysis	60	20	20	60	40	4	0	4	6

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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COURSE OBJECTIVES
The student will have the ability to:
1. To acquaint oneself with the fundamentals of voice production theory.
2. Apply techniques to transfer and preserve audio and video recordings.
3. Analyse voice and video recordings.
4. Compare and interpret voice and video samples.

COURSE OUTCOMES
Upon completion of the subject, students will be able to:
1. Understand the basic theory of voice production.
2. Understand the basics of video recordings.
3. Be able to use software tools to analyze voice recordings.
4. Be able to use software tools to analyze video recordings.
5. Understand the forensic importance of audio and video analysis.

COURSE CONTENT
Unit-I: Basics of Sound
Physics of sound: waves and sound, analysis, and synthesis of complex waves, Human and non-human utterances, anatomy of vocal tract, vocal formants, analysis of vocal sound, frequencies, and overtones. Electronics of Audio Recording, Transmission and Playback devices, noise and distortion, voice storage and preservation.
Unit-II: Speech Identification
Various approaches in Forensic Speaker Identification, Instrumental Analysis of speech sample, Interpretation of result, Statistical interpretation of probability scale, Objective/Subjective methods, discriminating tests, closed test, open test, Artificial Intelligence in Voice Identification.
Unit-III: Biometrics
likelihood ratio calculation. Concept of test and error in Speaker Identification, case studies. Automatic speaker identification and verification system, Voice Biometrics- principle, procedure, application, pros, and cons of voice biometrics.

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Unit-IV: Introduction to Video Technology

Introduction to video technology: electronic photography, scanning, synchronizing the analog signal, Digital signal processing, color video, Digital television standard, HD Video, digital scopes, compression, image acquisition and recording formats, optical media, time code, audio for video, displays.

Unit-V: Concepts of CCTV

Basics of CCTV, scope recognizing CCTV evidence & its nature, types of DVRs, DVR recording, evidence, best practices of CCTV evidence retrieval and storage at scene of crime and laboratory. challenges and precaution at the scene of crime. Authentication of Video evidence, video source identification techniques.

List of Practical:

1. Recording of specimen speech samples from a suspect.
2. Preservation of audio evidence.
3. Speaker-wise segregation of the speech sample of a recorded conversation spoken between two speaker software tools.
4. Transfer of audio file from a digital media to other media using standard software and authentication of recorded speech.
5. Detection of discontinuity(s) of voice recordings using voice spectrographic methods.
6. Spectrographic analysis of voice samples using software tool. Videography of simulated crime scene and its complete documentation.
7. Retrieval of video evidence from DVR.
8. Video analysis and detection of tampered video files using the Video analyzing tool.
9. Authentication of video evidence.
10. Video source identification.

Suggested Reading:

1. Bengold & Nelson Moryson; "Speech and Audio signal processing", John Wiley & Sons, USA (1999)
2. D.B. Fry; "The Physics of Speech, Cambridge University Press", (2004)
3. Dwight Bolinger et. al.; "Aspects of Language", Third Edition, Harcourt Brace Jovanovich College Publishers, USA, (1981)
4. Harry Hollien; "Forensic Voice Identification", Academic Press, London. (2001)
5. Austerberg David; "The Technology of Video & Audio Streaming", Focal Press, 2013.
6. Millerson Gerald; "Video Camera Techniques", Focal Press, 2006.
7. Musburger, B. Robert & Michael R. Ogden; "Single Camera Video Production", Focal Press, 2014.

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COURSE CODE	CATEGORY	COURSE NAME	TEACHING &EVALUATION SCHEME								
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	L	T	P	CREDITS
BDCF402	Minor 1	Computing Network Forensics	60	20	20	60	40	4	0	4	6

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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COURSE OBJECTIVES

The student will have the ability to:
1. Understand the concepts of networking.
2. Describe the various networking architectures.
3. Identify the protocols and services of different layers.

COURSE OUTCOMES
1. Upon completion of the subject, students will be able to:
2. Understand the concepts of networking.
3. Describe the various networking architectures.
4. Identify the protocols and services of different layers.
5. Distinguish the basic network configurations and standards associated with each network.

COURSE CONTENT

Unit-I Introduction To Data Communication
Data communication: Components, Data representation, Data flow, Networks: Network criteria, Physical Structures, Network types: LAN, WAN, Switching, The Internet.

Unit-II Protocol Layers
Protocol Layering: Scenarios, Principles, Logical Connections, TCP/IP Protocol Suite: Layered Architecture, Layers in TCP/IP suite, Description of layers, Encapsulation and Decapsulation, Addressing, Multiplexing and Demultiplexing, The OSI Model: OSI Versus TCP/IP.

Unit-III Link Layer Addressing
Nodes and Links, Services, Two Categories of link, Sublayers, Link Layer addressing: Types of addresses, ARP. Data Link Control (DLC) services: Framing, Flow and Error Control, Data Link Layer Protocols: Simple Protocol, Stop and Wait protocol, Piggybacking.

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Unit-IV Network Layers

Network Layer services: Packetizing, Routing and Forwarding, Other services, Packet Switching: Datagram Approach, Virtual Circuit Approach, IPV4 Addresses: Address Space, Classful Addressing, Classless Addressing, DHCP, Network Address Resolution, Forwarding of IP Packets: Based on destination Address and Label.

Unit-V Service Providing Protocols

providing services, Application-layer paradigms, Standard Client-Server Protocols: World Wide Web, Hyper Text Transfer Protocol, FTP: Two connections, Control Connection, Data Connection, Electronic Mail: Architecture, Web-Based Mail, Telnet: Local versus remote logging. Domain Name System: Name space, DNS in internet, Resolution, DNS Messages, Registrars, DDNS, security of DNS.

List of Practical:

1. Study different network devices.
2. Study basic network commands and network configuration commands.
3. Implement the concept of VLAN.
4. Implement the concept of static routing.
5. Implement the concept of dynamic routing.
6. Packet capture and header analysis.

Suggested Reading:

1. James J Kurose, Keith W Ross, "Computer Networks", Pearson Education.
2. Wayne Tomasi, "Introduction to Data Communication and Networking", Pearson Education.
3. Andrew S Tanenbaum, "Computer Networks", Prentice Hall.
4. William Stallings, "Data and Computer Communications", Prentice Hall.

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SEMESTER- IV