

North Bengal St. Xavier's College
Department of Computer Science & Application
LESSON PLAN session 2024-2025

Teacher:	Manoj Debnath	Designation:	Assistant Professor
Semester	3rd	Year	2nd
Lesson Type	Theory	Course:	Computer Networks (CC41)
Lectures	60 Lectures	Teaching Method:	Chalk & Talk, PPT

Objective: The objective of this syllabus is to provide students with a comprehensive understanding of computer networks, starting from basic concepts to advanced protocols. The course covers various aspects such as network topologies, protocols, and architectures (OSI and TCP/IP models), along with essential data communication techniques, switching methods, data link functions, and transport layer services. Additionally, the syllabus includes an exploration of application layer protocols like DNS, HTTP, and WWW, emphasizing their roles in internet communication.

Outcome: Upon completion of this course, students will have a solid understanding of the fundamental concepts of computer networks, including data transmission methods, error control, network topologies, and switching techniques. They will be proficient in explaining the functions and protocols of different network layers (data link, network, transport, and application), with practical knowledge of protocols like IP, TCP, DNS, and HTTP. Students will also develop the ability to analyse and design efficient networking solutions for real-world applications.

Timeline (in weeks)	Topics
1/2	Unit 1: Introduction to Computer Networks (8 Lectures) Network definition; network topologies; network classifications; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite.
2/3	Unit 2: Data Communication Fundamentals and Techniques (10 Lectures) Analog and digital signal; data-rate limits; digital to digital line encoding schemes; pulse code modulation; parallel and serial transmission; digital to analog modulation-; multiplexing techniques- FDM, TDM; transmission media.
2/3	Unit 3: Networks Switching Techniques and Access mechanisms (10 Lectures) Circuit switching; packet switching- connectionless datagram switching, connection-oriented virtual circuit switching; dial-up modems; digital subscriber line; cable TV for data transfer.
2/3	Unit 4: Data Link Layer Functions and Protocol (10 Lectures) Error detection and error correction techniques; data-link control- framing and flow control; error recovery protocols-stop and wait ARQ, go-back-n ARQ; Point to Point Protocol on Internet.
1	Unit 5: Multiple Access Protocol and Networks (5 Lectures) CSMA/CD protocols; Ethernet LANS; connecting LAN and back-bone networks- repeaters, hubs, switches, bridges, router and gateways;
1	Unit 6: Networks Layer Functions and Protocols (6 Lectures) Routing; routing algorithms; network layer protocol of Internet- IP protocol, Internet control protocols
1	Unit 7: Transport Layer Functions and Protocols (6 Lectures)

	Transport services- error and flow control, Connection establishment and release- three way handshaking
1	Unit 8: Overview of Application layer protocol (5 Lectures) Overview of DNS protocol; overview of WWW & HTTP protocol

Teacher:	Manoj Debnath	Designation:	Assistant Professor
Semester	3rd	Year	2nd
Lesson Type	Practical	Course:	Computer Networks Lab (CC41L)
Lectures	60 Hours	Teaching Method:	Hands-on, PPT

Objective: The objective of this laboratory course is to provide students with hands-on experience in simulating and implementing key networking algorithms and protocols. Through practical exercises, students will work with error detection techniques like CRC, flow control protocols such as stop and wait, sliding window protocols, as well as routing algorithms like distance vector and Dijkstra's algorithm to gain a deeper understanding of network behaviour in real-world scenarios.

Outcome: By the end of this lab course, students will have developed practical skills in simulating and implementing various network protocols and algorithms. They will be able to demonstrate proficiency in error detection, flow control, and routing techniques, and apply these concepts to solve networking problems in both theoretical and practical contexts.

Timeline (in weeks)	Topic
1~2	Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel.
1~2	Simulate and implement stop and wait protocol for noisy channel.
1~2	Simulate and implement go back n sliding window protocol.
1~2	Simulate and implement selective repeat sliding window protocol.
1~2	Simulate and implement distance vector routing algorithm
1~2	Simulate and implement Dijkstra's algorithm for shortest path routing.

Teacher:	Manoj Debnath	Designation:	Assistant Professor
Semester	5th	Year	3rd
Lesson Type	Theory	Course:	Information Security (DSE53L/E2)
Lectures	60 Lectures	Teaching Method:	Chalk & Talk, PPT

Objective: The objective of this course is to provide students with a thorough understanding of computer and network security, focusing on the principles, mechanisms, and practices needed to secure systems, programs, databases, and communications. Topics such as cryptography, program security, network security, database protection, and security administration are covered to equip students with the necessary skills to safeguard against cyber threats, understand ethical issues, and develop robust security policies.

Outcome: Upon completion of this course, students will be able to apply various security techniques including encryption, secure programming practices, and access control to protect information systems. They will understand the threats faced by systems and networks, and be capable of designing security measures such as firewalls, intrusion detection systems, and secure email systems. Additionally, students will have the ability to

conduct risk analysis, develop organizational security policies, and address ethical and legal issues in cybersecurity.

Timeline (in weeks)	Topics
1	Unit 1: Introduction (5 Lectures) Security, Attacks, Computer Criminals, Security Services, Security Mechanisms.
2	Unit 2: Cryptography (10 Lectures) Substitution ciphers, Transpositions Cipher, Confusion, diffusion, Symmetric, Asymmetric Encryption. DES Modes of DES, Uses of Encryption, Hash function, key exchange, Digital Signatures, Digital Certificates.
2	Unit 3: Program Security (10 Lectures) Secure programs, Non malicious Program errors, Malicious codes virus, Trap doors, Salami attacks, Covert channels, Control against program
2	Unit 4: Threats (10 Lectures) Protection in OS: Memory and Address Protection, Access control, File Protection, User Authentication.
2	Unit 5: Database Security (10 Lectures) Requirements, Reliability, Integrity, Sensitive data, Inference, Multilevel Security.
2	Unit 6: Security in Networks (10 Lectures) Threats in Networks, Security Controls, firewalls, Intrusion detection systems, Secure e-mails
1	Unit 7: Administrating Security(5 Lectures) Security Planning, Risk Analysis, Organisational Security Policy, Physical Security. Ethical issues in Security: Protecting Programs and data. Information and law.

Teacher:	Manoj Debnath	Designation:	Assistant Professor
Semester	5th	Year	3rd
Lesson Type	Theory	Course:	Info Security Lab (DSE53L/E2L)
Lectures	60 Lectures	Teaching Method:	Chalk & Talk, PPT

Objective: The objective of this practical syllabus is to equip students with hands-on experience in using essential network tools and security software. Students will gain practical skills in analyzing network activity, cracking passwords, performing encryption and decryption, and securing communications using various techniques and tools, including Nmap, Burp Proxy, and GPG. Additionally, the course emphasizes understanding and implementing security measures like digital signatures, password protection, and steganography for ensuring confidentiality and integrity in digital data.

Outcome: Upon completion of this practical course, students will be proficient in using a variety of network and security tools to monitor, protect, and analyze systems. They will be able to implement encryption algorithms, verify password strength, perform security assessments using tools like Nmap and Burp Proxy, and securely

Timeline (in weeks)	Topics
2	Demonstrate the use of Network tools: ping, ipconfig, ifconfig, tracert, arp, netstat, whois
3	Use of Password cracking tools: John the Ripper, Ophcrack. Verify the strength of passwords using these tools.
1	Perform encryption and decryption of Caesar cipher. Write a script for performing these operations.
1	Perform encryption and decryption of a Rail fence cipher. Write a script for performing these operations.
2	Use nmap/zenmap to analyse a remote machine.
2	Use Burp proxy to capture and modify the message.
1	Demonstrate sending of a protected word document.
1	Demonstrate sending of a digitally signed document.
1	Demonstrate sending of a protected worksheet.
2	Demonstrate use of steganography tools.
2	Demonstrate use of gpg utility for signing and encrypting purposes

send documents and encrypted messages. Furthermore, students will be able to apply cryptographic methods and use digital signatures to ensure the integrity and authenticity of electronic communications.

Name of the Teacher:	Manoj Debnath
Designation:	Assistant Professor
Semester/Year:	BCA & BSc. 1st year & 2nd Year/2nd Semester & 4th Semester
Lesson Type	Theory & Practical
Duration (Total):	44 Lectures
Course:	Object Oriented Programming using Java (MAJ4)
Method of Teaching:	Chalk & Talk, PPT, Hands-on/projector

Unit 1: Introduction to Java (4 Lectures)			
	Topic	Objective	Expected outcome
1	Java Architecture and Features, Understanding the semantic and syntax differences between C++ and Java,	Introduce Java as a OOP language. Appreciate the difference between other OOP language like C++	Basic familiarity of the programming language features.
2	Compiling and Executing a Java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments,	Familiarize with the syntax and semantics of Java programming language	Getting hands on Java programming fundamentals
3	Doing Basic Program Output, Decision Making Constructs	Understand the logical constructs initiating logical thinking	Hands on experience on building programming logic.

	(conditional statements and loops) and Nesting		
4	Java Methods (Defining, Scope, Passing and Returning Arguments, Type Conversion and Type and Checking, Built-in Java Class Methods).	Understanding how to modularize program logic through functions	Student should be able to segment program logic into small atomic structures.

Unit 2: Arrays, Strings, and I/O (7 Lectures)

1	Creating & Using Arrays, One Dimension and Multi-dimensional, Referencing Arrays Dynamically	Familiarize with array data structure	Students should be able to create and implement one/two-dimensional arrays
2	Java Strings: The Java String class, Creating & Using String Objects,	Understanding one of the most important class of Java	Build and use String class objects
3	Manipulating Strings, String Immutability & Equality	Understand mutability and immutability of string object	Basic string handling
4	Passing Strings To & From Methods	Manipulating strings through methods	Basic string handling
5	String Buffer Classes.	Understanding string mutability	Manipulate StringBuffer class
6	Simple I/O using System.out and the Scanner class	Working with console input and output	Console I/O with Scanner class
7	Byte and Character streams, Reading/Writing from console and files.	Understand byte and character streaming	File handling with java stream.

Unit 3: Object-Oriented Programming Overview(7 Lectures)

1	Principles of Object-Oriented Programming	OOPs concepts, features	Conceptual base of OOP
2	Defining & Using Classes, Controlling Access to Class Members	Understand basic construct of OOP	Creating UD class and objects
3	Class Constructors, Method Overloading	Object initialization with constructors	Initializing class properties
4	Class Variables & Methods	Understand encapsulation	Implement member functions of a class
5	Objects as parameters, final classes	Send/receive object as parameters, understand constants	Implement final class/object parameters
6	Object class,	Parent class of all classes in Java	Understand its utility
7	Garbage Collection.	Memory cleansing	Automatic garbage collection routine by JVM

Unit 4: Inheritance, Interfaces, Packages, Enumerations, Autoboxing and Metadata (10 lectures)

1	Inheritance	Basic idea	Conceptual understanding of inheritance with example
2	Single Level and Multilevel, Method Overriding, Dynamic Method Dispatch	Types of inheritance	Able to create inheritance of classes
3	Abstract Classes	Understand its utility	How to use it in association with inheritance
4	Interfaces and Packages	Pure abstract class, packaging	Create interface and package
5	Extending interfaces and packages	Inheritance with interfaces, package access	Implement and interface, show package access.
6	Package and Class Visibility	Scope of class and package	Implement class visibility example
7	Using Standard Java Packages	Overview of standard packages	Use of some common standard packages in java
8	Wrapper Classes	Conceptual base	Implement wrapper class utility
9	Autoboxing/Unboxing	Converting an object/primitive of a wrapper type to its corresponding wrapper/primitive value	Implement Autoboxing/Unboxing
10	Enumerations and Metadata		

Unit5: Exception Handling and Threading (6 Lectures)

1	Exception types, uncaught exceptions, throw, built-in exceptions	Utility of Exception in Java	Understand the basic idea
2	Creating your own exceptions	Create exception	Implement basic exception mechanism
3	Multi-threading: The Thread class and Runnable interface, creating single and multiple threads	Understand thread and multithreading	Implement basic thread mechanism
4	Thread prioritization, synchronization and communication, suspending/resuming threads	Thread synchronization	Implement thread synchronization
5	Using java.net package, Overview of TCP/IP and Datagram programming	Understand socket programming	Implement network program through socket

6	Accessing and manipulating databases using JDBC.	Understand JDBC	Implement database connectivity with Java, basic CRUD
Unit6: Applets and Event Handling (10 Lectures)			
1	Java Applets:Introduction to Applets, Writing Java Applets	Introduction to GUI programming in Java	Implement basic GUI
2	Working with Graphics	Understand Graphics class	Implement Graphic painting in GUI
3	Incorporating Images & Sounds	Working Sound and images	Basic implementation
4	Event Handling Mechanisms	Event handling in GUI	Implement mouse, keyboard event handling
5	Listener Interfaces	Event handling classes	Implement mouse, keyboard event handling
6	Adapter and Inner Classes	Event handling	Implement mouse, keyboard event handling
7	The design and Implementation of GUIs using the AWT controls	GUI programming	Implement GUI interface in Java
8	Swing components of Java Foundation Classes such as labels, buttons, textfields, layout managers, menus, events and listeners;	Working with JFC and swing components	Implement GUI interface
9	Graphic objects for drawing figures such as lines, rectangles, ovals, using different fonts.	Painting through Graphics class	Working with graphics in GUI interface
10	Overview of servlets	Basic overview	Basic understanding of client-server programming.

Name of the Teacher: **Manoj Debnath**
 Designation: **Assistant Professor**
 Semester/Year: **BCA 3rd year/6th Semester**
 Lesson Type **Theory**
 Duration (Total): **54 Lectures**
 Course: **Mobile Computing (CC61)**
 Method of Teaching: **Chalk & Talk, PPT**

Unit 1: Introduction to mobile communication and computing (6 Lectures)			
	<i>Topic</i>	<i>Objective</i>	<i>Expected outcome</i>
1	Mobile Computing (MC): Introduction to MC	To enable computing and information access anytime, anywhere .	Increased productivity, Enhanced Connectivity.
2	Novel Applications, Limitations, and Architecture	To enable computing and information access anytime, anywhere .	Increased productivity, Enhanced Connectivity.
3	GSM: Mobile Services, System Architecture	To enable computing and information access anytime, anywhere .	Increased productivity, Enhanced Connectivity.
4	Radio Interface, Protocols	To enable computing and information access anytime, anywhere .	Increased productivity, Enhanced Connectivity.
5	Localization and Calling	To enable computing and information access anytime, anywhere .	Increased productivity, Enhanced Connectivity.
6	Handover, Security, and New Data Services.	To enable computing and information access anytime, anywhere .	Increased productivity, Enhanced Connectivity.
Unit 2: (Wireless) Medium Access Control (6 Lectures)			
1	Motivation for a Specialized MAC	Channel Access, Collision Avoidance/ Resolution, Data Transmission, Addressing.	Efficient Network use, Reliable Data Delivery, Network Security.
2	Hidden and Exposed Terminals	Channel Access, Collision Avoidance/ Resolution, Data Transmission, Addressing.	Efficient Network use, Reliable Data Delivery, Network Security.
3	Near and Far Terminals	Channel Access, Collision Avoidance/ Resolution, Data Transmission, Addressing.	Efficient Network use, Reliable Data Delivery, Network Security.
4	SDMA	Channel Access, Collision Avoidance/ Resolution, Data Transmission, Addressing.	Efficient Network use, Reliable Data Delivery, Network Security.
5	FDMA, TDMA	Channel Access, Collision Avoidance/ Resolution, Data Transmission, Addressing.	Efficient Network use, Reliable Data Delivery, Network Security.
6	CDMA	Channel Access, Collision Avoidance/ Resolution, Data Transmission, Addressing.	Efficient Network use, Reliable Data Delivery, Network Security.
Unit 3: Mobile Network Layer (8 Lectures)			
1	Mobile IP	To find out the location of networking device.	Identification of a host or a network or identifying the location of a device.
2	IP Packet Delivery	To find out the location of networking device.	Identification of a host or a network or identifying the location of a device.
3	Agent Advertisement and Discovery	To find out the location of networking device.	Identification of a host or a network or identifying the location of a device.

4	Registration	To find out the location of networking device.	Identification of a host or a network or identifying the location of a device.
5	Tunneling And Encapsulation	To find out the location of networking device.	Identification of a host or a network or identifying the location of a device.
6	Optimizations	To find out the location of networking device.	Identification of a host or a network or identifying the location of a device.
7	Dynamic Host Configuration Protocol	To find out the location of networking device.	Identification of a host or a network or identifying the location of a device.
8	DHCP	To find out the location of networking device.	Identification of a host or a network or identifying the location of a device.

Unit 4: Mobile Transport Layer (8 Lectures)

1	Traditional TCP	Reliable Data Delivery, Addressing Mobile Network Challenges.	Improved Throughput, Reduced Latency.
2	Indirect TCP	Reliable Data Delivery, Addressing Mobile Network Challenges.	Improved Throughput, Reduced Latency.
3	Snooping TCP	Reliable Data Delivery, Addressing Mobile Network Challenges.	Improved Throughput, Reduced Latency.
4	Mobile TCP	Reliable Data Delivery, Addressing Mobile Network Challenges.	Improved Throughput, Reduced Latency.
5	Fast Retransmit/Fast Recovery	Reliable Data Delivery, Addressing Mobile Network Challenges.	Improved Throughput, Reduced Latency.
6	Transmission /Time-Out Freezing	Reliable Data Delivery, Addressing Mobile Network Challenges.	Improved Throughput, Reduced Latency.
7	Selective Retransmission	Reliable Data Delivery, Addressing Mobile Network Challenges.	Improved Throughput, Reduced Latency.
8	Transaction Oriented TCP	Reliable Data Delivery, Addressing Mobile Network Challenges.	Improved Throughput, Reduced Latency.

Unit5: Database Issues (8 Lectures)

1	Hoarding Techniques	To ensure data integrity, Security and efficient management.	Improved Data Access, Reduced data redundancy, increased security.
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2	Caching Invalidation Mechanisms	To ensure data integrity, Security and efficient management.	Improved Data Access, Reduced data redundancy, increased security.
3	Client Server Computing With Adaptation	To ensure data integrity, Security and efficient management.	Improved Data Access, Reduced data redundancy, increased security.
4	Power-Aware And Context-Aware Computing	To ensure data integrity, Security and efficient management.	Improved Data Access, Reduced data redundancy, increased security.
5	Transactional Models	To ensure data integrity, Security and efficient management.	Improved Data Access, Reduced data redundancy, increased security.
6	Query Processing	To ensure data integrity, Security and efficient management.	Improved Data Access, Reduced data redundancy, increased security.
7	Recovery	To ensure data integrity, Security and efficient management.	Improved Data Access, Reduced data redundancy, increased security.
8	Quality Of Service Issues	To ensure data integrity, Security and efficient management.	Improved Data Access, Reduced data redundancy, increased security.

Unit6: Data Dissemination (6 Lectures)

1	Communications Asymmetry	To make data accessible and useful to a wide range of users.	Improved knowledge and understanding, enhanced decision making.
2	Classification of New Data Delivery Mechanisms	To make data accessible and useful to a wide range of users.	Improved knowledge and understanding, enhanced decision making.
3	Push based Mechanisms	To make data accessible and useful to a wide range of users.	Improved knowledge and understanding, enhanced decision making.
4	Pull-Based Mechanisms	To make data accessible and useful to a wide range of users.	Improved knowledge and understanding, enhanced decision making.
5	Hybrid Mechanisms	To make data accessible and useful to a wide range of users.	Improved knowledge and understanding, enhanced decision making.
6	Selective Tuning (Indexing) Techniques	To make data accessible and useful to a wide range of users.	Improved knowledge and understanding, enhanced decision making.

Unit 7: Mobile Ad Hoc Networks (MANETS) (5 Lectures)			
1	Overview, Properties of A MANET	To enable communication between mobile devices in a decentralized manner.	Emergency Response, Disaster Relief, Sensor Networks.
2	Spectrum Of MANET Applications	To enable communication between mobile devices in a decentralized manner.	Emergency Response, Disaster Relief, Sensor Networks.
3	Routing	To enable communication between mobile devices in a decentralized manner.	Emergency Response, Disaster Relief, Sensor Networks.
4	Various Routing Algorithms	To enable communication between mobile devices in a decentralized manner.	Emergency Response, Disaster Relief, Sensor Networks.
5	Security In MANET	To enable communication between mobile devices in a decentralized manner.	Emergency Response, Disaster Relief, Sensor Networks.
Unit 8: Protocols and Tools (6 Lectures)			
1	Wireless Application Protocol- WAP	To ensure reliable data transmission by checking errors and provide security.	Improved Throughput, Reduced Latency.
2	Protocol Architecture	To ensure reliable data transmission by checking errors and provide security.	Improved Throughput, Reduced Latency.
3	Treatment Of Protocols Of All Layers	To ensure reliable data transmission by checking errors and provide security.	Improved Throughput, Reduced Latency.
4	Bluetooth	To ensure reliable data transmission by checking errors and provide security.	Improved Throughput, Reduced Latency.
5	Bluetooth User Scenarios, Physical Layer, Mac Layer, Networking, Security, Link Management	To ensure reliable data transmission by checking errors and provide security.	Improved Throughput, Reduced Latency.
6	J2ME	To ensure reliable data transmission by checking errors and provide security.	Improved Throughput, Reduced Latency.