

Course Code	Course Title	L	T	P	C
BACSE203	Computer Networks	3	0	2	4
Pre-requisite	NIL	Syllabus Version			
		1			
Course Objectives					
1. To foster students' understanding of the core concepts of computer networking, including protocols, architectures, and their applications. 2. To empower students with the knowledge to design, implement, and analyze the performance of OSI and TCP/IP architectures effectively. 3. To identify appropriate application layer protocols for specific applications and their corresponding security mechanisms.					
Course Outcomes					
1. Interpret the different building blocks of networks. 2. Analyze the error and flow control mechanisms for connecting a network. 3. Design and configure efficient networks using switching, IP, routing, NAT multicast, and IPv6, to optimize scalability and performance 4. Examine the essential factors for reliable transport layer services, flow control, connection management and analyze the consequences of congestion on their performance. 5. Assess the significance of application layer services and their associated protocols for seamless network communication and functionality					
Module:1	Networking Foundations	8 hours			
Layering and Protocols-Network Topology - Encapsulation -Multiplexing and De-multiplexing - OSI Model, TCP/IP model- Basics of Physical Layer-Internet Architecture-Application Programming Interface (Sockets) - Performance Metrics (Throughput, Bandwidth, Delay and Latency) - High-Speed Networks.					
Module:2	Direct Links	9 hours			
Connecting to a Network - Encoding – Framing: Byte-Oriented Protocols (PPP), Bit-Oriented Protocols (HDLC); Ethernet (IEEE 802.3); Error Detection: Internet Checksum Algorithm, Cyclic Redundancy Check –Error Correction- Hamming Code; Reliable Transmission: Stop-and-Wait, Sliding Window - Multiple-access Networks: Access Protocol, Wireless Networks: 802.11/Wi-Fi, Bluetooth (802.15.1) - Access Networks, Cellular Network.					
Module:3	Internetworking	10 hours			
Switching Basics – Datagrams, Virtual Circuit Switching, Virtual LANs (VLANs); Internet (IP) – Internetwork, Service Model, Global Addresses, Datagram Forwarding in IP, Classful addressing, Subnetting and Classless Addressing, Address Resolution Protocol (ARP), Dynamic Host Configuration Protocol (DHCP), Error Reporting-ICMP, Network Address Translation (NAT), Routing - Network as a Graph, Distance-Vector-RIP, Link State-OSPF, Metrics, Implementation-Performance Analysis- Packet Tracer; Global Internet - Routing					

Areas, Interdomain Routing -BGP; IP Version 6 - Addresses and Routing, Packet Format, Advanced Capabilities; Multicast - Multicast Addresses, Multicast Routing -DVMRP		
Module:4	End to End Protocols	8 hours
Simple Demultiplexer (UDP), Reliable Byte Stream (TCP) - End-to-End Issues, Segment Format, Connection Establishment and Termination, Sliding Window, Triggering Transmission, Adaptive Retransmission, Record Boundaries, TCP Extensions, Performance, Alternative Design Choices-SCTP. Remote Procedure Call (RPC)- Fundamentals, Quality of Service -Allocating Resources - Issues in Resource Allocation; Queuing Disciplines - FIFO, Fair Queuing; TCP Congestion Control; Advanced Congestion Control, Quality of Service		
Module:5	End to End Data	8 hours
Security Attacks - Trust and Threats, IP Security (IPsec), Firewalls; Applications - Electronic Mail (SMTP, MIME, POP3), World Wide Web (HTTP), FTP, Telnet, Infrastructure Applications-DNS, SNMP; Software Defined Network (SDN)- introduction.		
Module:6	Contemporary Issues	2 hours
Industry practices like Netconf and Telemetry		
Total Lecture Hours:		45 hours
Text Book(s)		
Larry L. Peterson, Bruce S. Davie, " Computer Networks : A Systems Approach ", The Morgan Kaufmann Series in Networking, 6 th Edition, 2021		
Reference Books		
Behrouz A. Forouzan, " Data communication and Networking ", McGraw Hill Education, 6 th Edition, 2022 James F. Kurose and Keith W.Ross, " Computer Networking: A Top-Down Approach ", Pearson Education, 9 th Edition, 2025 William Stallings, " Data and Computer Communication ", Pearson India Education Services Pvt Ltd, 10 th Edition, 2022		
Indicative Experiments		
1. Study of Basic Network Commands, Demonstration of all networking hardware and their functionalities.		2 hours
2. Error detection and Correction mechanisms (CRC, Checksum, Hamming Code)		2 hours
3. Flow control mechanisms (Stop and Wait, Sliding Window)		4 hours
4. IP Addressing and Subnetting		2 hours
5. Cisco Packet Tracer Simulation – LAN, Static routing, VLANs		4 hours
6. Socket programming – UDP, TCP, multi-client chatting		4 hours

7. Adaptive Retransmission- Nagle's Algorithm, Karn's Patridge Algorithm, Jacobson/Karels algorithm	4 hours
8. Remote Procedure Call	2 hours
9. Hands on WireShark - Capture filter, Display filter, simple attacks	2 hours
10. Implementing basic SDN topology with Mininet	4 hours
Total Laboratory Hours:	30 hours
Mode of Evaluation : Continuous Assessment Test, Digital Assignment, Quiz, Final Assessment Test, Lab Continuous Assessment, Lab Final Assessment, Seminar, Group Discussion, Presentaion	
Recommended by Board of Studies :	21-05-2025
Approved by Academic Council : No. 78	12-06-2025