**CSE 317: Computer Networks**

**Part A**

**Course Code:** CSE 317

**Course Title:** Computer Networks

**Course Type:** Core Course **Year/Semester:** 6th Semester **Academic Session:**

**Course Teacher:**

**Pre-requisite:** CSE 313 Data Communication

**Credit Value:** 3.0 credits

**Contact Hours:** 3:00 Hours/Week

**Total Marks:** 100

**Rationale of the Course:** This course is based on the fundamental concepts about the standard models for the layered approach to communication between autonomous machines in a network, and the main characteristics of data transmission across various physical link types. It considers how to design networks and protocols for diverse situations, analyses several application and support protocols from a distributed systems viewpoint, and identifies significant problem areas in networked communications. This course focuses on to create a competent workforce in Computer Networking environment.

**Course Objectives:**

* Learn the need, use and development of computer networks and internet.
* Gain knowledge about the layered architecture and protocols with data transmission.
* Learn the Internet technologies with IP addressing.  Learn the application of computer networks.

**Course Learning Outcomes (CLOs):**

|  |  |
| --- | --- |
| CLO 1 | Learn the need, use and development of computer networks. |
| CLO 2 | Learn the layered architecture and protocols. |
| CLO 3 | Understand the Internet technologies with IP addressing. |
| CLO 4 | Understand the application of computer networks. |

**Mapping of Course Learning Outcomes (CLOs) with Program Learning Outcomes (PLOs):**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Course Learning Outcomes (CLOs) | Program Learning Outcomes(PLOs) | | | | | |  |  |  |  |  |  |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| CLO 1 | X | X | X | X | X | X | X |  | X |  |  |  |
| CLO 2 |  | X |  |  | X |  |  |  |  |  |  |  |
| CLO 3 |  |  |  | X | X |  |  |  | X |  |  |  |
| CLO 4 |  |  | X |  |  |  | X |  | X | X |  |  |

**Part B**

**Course Content**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Week** | **Topic** | **Teaching**  **Learning**  **Strategy** | **Assessment Strategy** | **Corresponding CLOs** |
| 1 | **Introduction**   * [What is a Network?](https://www.geeksforgeeks.org/network-and-communication/) * [Local Area Network (LAN)](https://www.geeksforgeeks.org/lan-full-form/) * Network Topology * OSI Layers | Lecture, Discuss | Q/A,  Assignment | CLO 1 |
| 2 | **Components**   * [NIC Explanation](https://www.geeksforgeeks.org/nic-full-form/) * [Switch Explanation](https://www.geeksforgeeks.org/what-is-a-network-switch-and-how-does-it-work/) * [Hub Explanation](https://www.geeksforgeeks.org/what-is-network-hub-and-how-it-works/) * [Router Explanation](https://www.geeksforgeeks.org/introduction-of-a-router/) * [Cable Explanation](https://www.geeksforgeeks.org/types-of-ethernet-cable/) | Lecture,  Explain,  Discuss | Q/A, Test | CLO 1, CLO 2 |
| 3 | **Application Layer**  HTTP, FTP, Telnet, IMAP, DNS | Lecture,  Explain,  Recognize | Q/A, Test | CLO 1, CLO 2 |
| 4 | **Transport Layer**   * [Transport Layer Explanation](https://www.geeksforgeeks.org/transport-layer-responsibilities/) * [Ports](https://www.geeksforgeeks.org/introduction-of-ports-in-computers/) * [TCP](https://www.geeksforgeeks.org/what-is-transmission-control-protocol-tcp/) * [TCP Three-Way Handshake](https://www.geeksforgeeks.org/tcp-3-way-handshake-process/) * [UDP](https://www.geeksforgeeks.org/user-datagram-protocol-udp/) | Lecture, | Q/A, Test, | CLO 2 |
| 5 | **Network Layer**   * [IP Header](https://www.geeksforgeeks.org/introduction-and-ipv4-datagram-header/) * [Unicast, Multicast, and Broadcast Addresses](https://www.geeksforgeeks.org/difference-between-unicast-broadcast-and-multicast-in-computer-network/) * [Types of IP Addresses](https://www.geeksforgeeks.org/structure-and-types-of-ip-address/) | Exercise | Presentation | CLO 2 |
| 6 | **IPv4 Addressing**   * [Ipv4 Address Explanation](https://www.geeksforgeeks.org/what-is-ipv4/) * Converting IP Address – Decimal to Binary * [Subnet Mask](https://www.geeksforgeeks.org/role-of-subnet-mask/) * [Classes of IP Addresses](https://www.geeksforgeeks.org/introduction-of-classful-ip-addressing/) | Explain, Analysis, group discussion | Q/A,  Assignment | CLO 4 |
| 7 | Review Class  **Mid Term Break** | Lecture,  Addressing  Mistake | Q/A, Test | CLO 3 |
| 8 | **Subnetting**   * [Subnetting](https://www.geeksforgeeks.org/introduction-to-subnetting/) * [CIDR (Classless Inter-Domain Routing)](https://www.geeksforgeeks.org/classless-inter-domain-routing-cidr/) * [Create Subnets](https://www.geeksforgeeks.org/introduction-to-subnetting/) * [Variable Length Subnet Masks (VLSM)](https://www.geeksforgeeks.org/introduction-of-variable-length-subnet-mask-vlsm/) * [Private IP Addresses](https://www.geeksforgeeks.org/private-ip-addresses-in-networking/) | Lecture,  Explain,  Discuss | Q/A, Test | CLO 2 |
| 9 | ****IPv6 Addressing and Routing**** | Lecture,  Explain,  Discuss | Q/A, Test | CLO 1, CLO 2 |
| 10 | **Dynamic Routing Protocols****Interior Gateway Protocols****Open Shortest Path First (OSPF)** | Lecture,  Explain,  Discuss | Q/A, Test  Assignment | CLO 1, CLO 2 |
| 11 | **Virtual Local Area Network (VLAN)****Inter-VLAN Routing****Dynamic Host Control Protocol (DHCP)** | Lecture,  Explain,  Discuss | Q/A, Test | CLO 3 |
| 12 | **Spanning Tree Protocol (STP)****Access Control List (ACL)****Network Address Translation (NAT)** | Lecture,  Explain,  Discuss | Q/A, Test | CLO 1 |
| 13 | **Data Link Layer**   * [Ethernet](https://www.geeksforgeeks.org/local-area-network-lan-technologies/) * [Ethernet Frame](https://www.geeksforgeeks.org/ethernet-frame-format/) * [MAC](https://www.geeksforgeeks.org/introduction-of-mac-address-in-computer-network/) & [IP Address](https://www.geeksforgeeks.org/what-is-an-ip-address/) | Lecture,  Explain,  Discuss | Q/A, Test  Assignment | CLO 4 |
| 14 | **Physical Layer**   * [Types of Ethernet Cabling](https://www.geeksforgeeks.org/types-of-ethernet-cable/) * [IEEE Ethernet Standards](https://www.geeksforgeeks.org/ethernet-frame-format/) * [Cisco PoE Explained](https://www.geeksforgeeks.org/what-is-power-over-ethernet-poe/) | Lecture,  Explain,  Discuss | Q/A, Test | CLO 1, CLO 2 |

**Part C**

**Assessment and Evaluation**

**Assessment Strategy and Marks distribution:**

|  |  |  |
| --- | --- | --- |
| Assessments |  | % |
| Continuous Assessment | Class Participation and Performance | 10 |
| Class Test/Quiz | 10 |
| Assignment/Presentation | 10 |
| Summative Assessment | Midterm Examination | 30 |
| Final Exam | 40 |
| **Total** |  | **100** |

**Part D**

**Learning Materials**

**Recommended Readings**

* TCP / IP Protocol Suite, Behrouz A. Forouzan, Fourth Edition.
* Computer Networks, Andrew S. Tanenbaum, David J. Wetherall, Fifth Edition (2011), Prentice Hall
* Data Communications and Networking, Behrouz A. Forouzan, Fifth Edition (2013), Mcgraw Hill  Fundamentals of Data Communication Networks, Oliver C. Ibe, First Edition (2018), John Wiley & Sons, Inc.
* Data and Computer Communications, William Stallings, Tenth Edition (2014), Pearson

**Supplementary Readings**

* Computer Networking A Top-Down Approach, James F. Kurose, Keith W. Ross, Seventh Edition (2017), Pearson
* Computer Networks A Systems Approach, Larry L. Peterson and Bruce S. Davie, Sixth Edition (2020), Morgan Kaufmann Publishers
* The Internet and Its Protocols A Comparative Approach, Adrian Farrel, First Edition (2004), Morgan Kaufmann Publishers
* Internetworking with TCP/IP Principles, Protocols, and Architecture, Douglas E. Comer, Sixth Edition (2014), Volume 1, Pearson Education, Inc.

**Others (as applicable for the discipline/academic program)**

* Follow provided lecture notes and use Internet to get documents on specific topics.