



**Course Name:** Computer Networks Lab

**Course Code:** T7482

**Faculty:** Engineering

**Course Credit:** 1

**Course Level:** 2

**Sub-Committee (Specialization):** Computer Science

**Learning Objectives:**

The students will be able to:

Primary objective of this course is to get familiarly the basics of networking, Internet, networking protocols and layered architecture of network

To explore and learn application layer protocols such as Domain Name Server, HTTP, FTP and SMTP.

Further investigation of TCP flow control, congestion control and congestion avoidance.

To explore and learn working of routing protocols and algorithms for wired and wireless network.

**Course Outcomes:**

**CO1:** Understand and describe the fundamental concepts of computer networking, including networking devices and layered architecture.  
**CO2:** Develop and implement socket programming solutions for reliable (TCP) and unreliable (UDP) transport layer communication, including client and server applications.  
**CO3:** Analyze and interpret application layer protocols (e.g., DNS) and packet flows using tools like packet tracer to identify protocol operations and message exchanges.  
**CO4:** Design and implement network algorithms such as Sliding Window Protocol, Traffic Shaping Algorithms, and Distance Vector Routing to optimize and manage data transmission.

**Program Outcome (PO):**

1. Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
2. Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal, and environmental considerations.
4. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
5. Create, select and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Function effectively as an individual and as a member or leader indiverse teams and in multidisciplinary settings.
10. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
11. Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadcast context of technological change.
12. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.

**Books Recommended:**

| **Book** | **Author** | **Publisher** |
| --- | --- | --- |
| An Engineering Approach to Computer Networking | Keshav S. | Addison-Wesley, 1997. |
| Computer Communications and networking Technologies, ISBN 8811 - 240 - 354 X. | Gallo M., Hancock W. | Thomson Brooks/Cole |
| Computer Networks and Internet, 2nd Edition, ISBN 81 -7808-086-9. | Comer D. | Fieatson Education |
| Computer Networks,4th Edition, ISBP 81  - 203 - 2175 8. | Tanenbaum A | PHI |
| Computing approximate blocking probabilities for a class of all-optical networks | IEEE J. Select. Areas Commun./J. Lightwave Technol., Special Issue Optical Networks | NA |
| Computing approximate blocking probabilities in wavelength routed  all-optical networks with limited-range wavelength conversion | IEEE Journal | NA |
| Data Communications and Networking, 3rd edition, 2004, ISBN 0 - 07 - 058408  7. | Fourauzan B. | Tata McGtaw Hill Publications |
| Data Networks, 2nd Ed. | Bertsekas D. and Gallager R., Englewood Cliffs | Prentice-Hall. |
| Design and Analysis of Computer Communication Networks | Vijay Ahuja | McGraw Hill. |
| FTP Extensions for IPv6 and NATs | NA | NA |
| Networking - The Complete Reference | Zacker | Tata McGraw Hill. |
| Packet error rate analysis of ieee  802.15.4 under IEEE 802.11b  interference | LNCS: Wired/Wireless Internet Communications | NA |
| Performance of alternate routing methods in all-optical switching networks | Proc. IEEE INFOCOM | NA |
| Routing and wavelength assignment in all-optical networks | IEEE/ACM Trans. Networking | NA |
| Telecommunication Network Design Algorithms. | Kershenbaum A. | Tata McGraw Hill. |
| Telecommunications and Information Exchange between Systems - Local and Metropolitan Area Networks - Common Specifications - Part 3: Media Access Control (MAC) Bridges | ANSI/IEEE Std 802 | NA |

| **Sr.**  **No.** | **Topic** | **Actual Teaching Hours** | **Contact Hours Equivale nce** |
| --- | --- | --- | --- |
| 1 | **Study of Basic elements of computer networking with details of networking devices.** | **1** | **4** |
|  | **Socket Programming for Transport Layer packets** | **4** | **4** |
| 2 | **Socket Programming for Transport Layer packets (TCP server)** |  |  |
| 3 | **Socket Programming for Transport Layer packets (TCP client)** |  |  |
| 4 | **Socket Programming for Transport Layer packets (UDP server)** |  |  |
| 5 | **Socket Programming for Transport Layer packets (UDP client)** |  |  |
| 6 | **Analysis of Application layer packet (DNS) using DNS commands & Analysis using a packet tracer tool.** | **2** | **4** |
| 7 | **Packet Analysis using a packet tracer tool with detailed analysis of Application Layer packets.** | **2** | **4** |
| 8 | **Implement Sliding Window Protocols.** | **2** | **4** |
| 9 | **Implement Traffic shaping Algorithms** | **2** | **4** |
| 10 | **Implement Distance Vector Algorithm** | **2** | **4** |
| **Total** | | **15** | **28** |

**Course Outline:**

**Pre Requisites: Evaluation:** None

**Pedagogy:** Assignment Quiz Seminars Written exam

**CO-PO-Mapping:**

The mapping is typically represented using a scale (1, 2, 3) where:

1: Low Contribution

2: Medium Contribution

3: High Contribution

|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | 3 | 2 | - | - | 1 | - | - | - | - | - | - | 2 |
| **CO2** | 3 | 2 | - | - | 2 | - | - | - | - | - | - | 2 |
| **CO3** | 3 | 3 | 2 | 2 | 2 | - | - | - | - | - | - | 2 |
| **CO4** | 3 | 3 | 2 | 2 | 3 | - | - | - | - | - | - | 2 |