

Name of Institute: Indus Institute of Technology & Engineering
Name of Faculty: Roshni Patel

Course code: CE0518

Course name: Computer Network

Pre-requisites: - Basics of data communication

Credit points: 3

Offered Semester: V

Course coordinator

Full name: Roshni Patel

Department with siting location: Computer Science & Engineering Dept
4th Floor Bhawar Building

Telephone: 8511109249

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Consultation times:

Monday 3.30pm to 5:00pm

Friday 03.30pm to 5.00pm

Course lecturer

Full name: Madhvi Bera

Department with siting location: Computer Science & Engineering Dept.
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Consultation times:

Monday 3.30pm to 5:00pm

Friday 03.30pm to 5.00pm

Students will be contacted throughout the session via mail with important information relating to this course.

Course Objectives

1. To understand the significance and concepts of the layered model for computer networking.
2. Provides knowledge about computer network related hardware and software using a layered architecture.
3. Identify basic protocols and design issues for layered model.
4. Seeking employment that will allow use of troubleshooting and analysis skills.
5. The emphasis of the course will be developing skills in the concepts and the engineering tradeoffs involved in the working of the network protocols.

Course Outcomes (CO)

By participating in and understanding all facets of this course a student will be able to:

- 1) Independently understand basic computer network technology.
- 2) Understand and explain Data Communications System and its components.
- 3) Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
- 4) Identify the different types of network devices and their functions within a network
- 5) Understand and building the skills of subnetting and routing mechanisms.
- 6) Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

Course Outline

UNIT-I	[12 Hours]
Introduction to Computer Networks	
Basics of Data Communication System and its components, Computer network and its goals, Types of computer networks: LAN, MAN, WAN, Wireless networks, Transmission media, Network software: concept of layers, protocols, interfaces and services, ISO-OSI reference model, TCP/IP reference model.	
Data Link Layer	
Design issues, Framing, Types of Errors, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop & Wait ARQ, Go-back-N ARQ, Selective repeat ARQ. Data link protocols: HDLC and PPP.	
UNIT-II	[12 Hours]
Medium Access Sub-Layer:	
Static and dynamic channel allocation, Random Access: ALOHA, CSMA protocols, Controlled Access: Polling, Token Passing, IEEE 802.3 frame format, Manchester encoding, collision detection in 802.3, Binary exponential back off algorithm.	
UNIT-III	[12 Hours]
Network Layer:	
Design issues, IPv4 classful and classless addressing, sub netting, Protocols: IP, ARP, RARP, ICMP, Routing algorithms: distance vector and link state routing, shortest path algorithm, Routing protocols: IGMP, OSPF, RIP, BGP, flooding,	

Congestion control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket and token bucket algorithms.

UNIT-IV

[12 Hours]

Transport Layer:

Elements of transport protocols, introduction to TCP/UDP protocols and their comparison. The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Connection Management Modeling, The TCP Sliding Window Congestion control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket and token bucket algorithms.

Application Layer:

Hyper Text Transfer Protocol (HTTP), Domain Name System (DNS), File Transfer Protocol (FTP), Dynamic Host Configure Protocol (DHCP)

Method of delivery

Chalk and Board, PowerPoint presentation, Model generation, demonstration of devices, cables

Study time

3 hrs theory, 2 Hrs practical

CO-PO Mapping (PO: Program Outcomes)

Course Outcome	Program Outcomes												Program Specific Outcomes		
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS 01	PS 02	PS 03
1	√			√	√								√		√
2	√	√		√	√									√	√
3	√						√							√	√
4	√	√		√			√								
5	√		√				√								
6	√	√		√			√								√

Blooms Taxonomy and Knowledge retention (For reference)

(Blooms taxonomy has been given for reference)

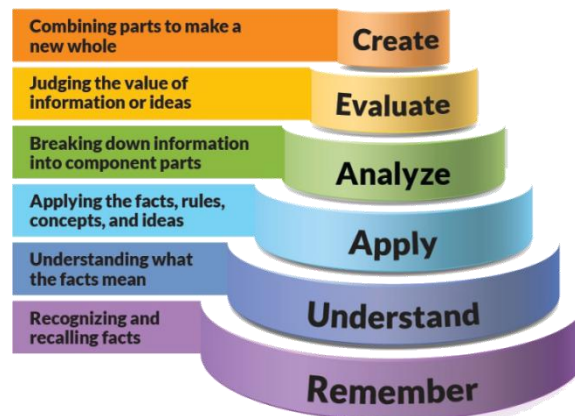


Figure 1: Blooms Taxonomy

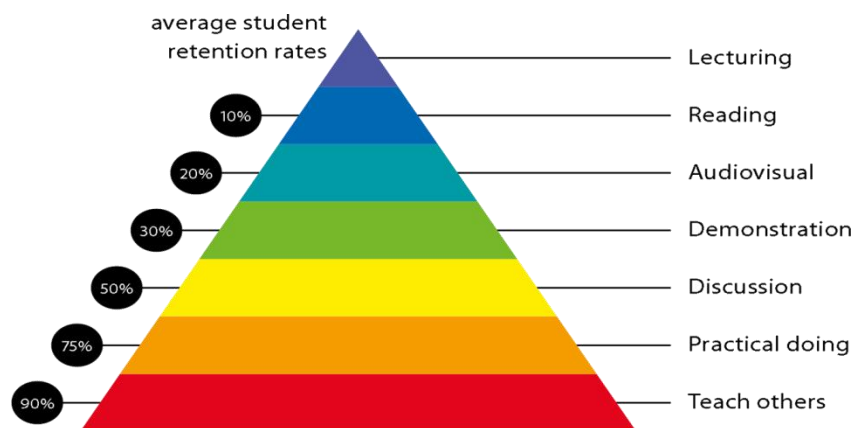


Figure 2: Knowledge retention

Graduate Qualities and Capabilities covered
(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of Graduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	1 Professional knowledge, grounding & awareness
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.	2 Information literacy, gathering & processing
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	4 Problem solving skills
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	5 Written communication
	6 Oral communication
	7 Teamwork
Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	10 Sustainability, societal & environmental impact

Practical work:

1	To study different types of topologies.	Basic knowledge of different topologies
2	To study and implement different categories of networks.	Basic of knowledge of categories of network
3	To study different types of transmission media.	Basic knowledge of various medium
4	To compare OSI and TCP/IP protocol Model.	Compare Models
5	To demonstrate Networking and Internetworking devices (NIC, Switch, Hub, Router, Gateway, Repeater, Bridges, Cables)	Able to distinguish between different devices.
6	Write a program which demonstrates the concept of bit stuffing.	To implement bit stuffing
7	Write a program which demonstrates the concept of byte stuffing.	To implement byte stuffing
8	Write a program to demonstrate the concept of PARITY CHECKING.	To determine error in transmission
9	Write a program to demonstrate the concept of Error Detection Methods LRC,VRC.	To implement and find error.
10	Write a program to demonstrate the concept of Error Detection Method CRC.	To implement and find error.
11	Configuration of router in packet tracer using command line.	To configure router.
12	Configuration of router in packet tracer using Configuration terminal.	To configure router.
13	Simulation of RIP protocol in packet tracer.	To simulate protocols
14	Simulation of ARQ and RARQ protocol in packet tracer.	To simulate protocols

Lecture/tutorial times

(Give lecture times in the format below)

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Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for semester examinations.

Text Books:

1. Data Communications and Networking, Fourth Edition by Behrouza A. Forouzan, TMH.
2. Computer Networks, A.S. Tanenbaum, 4th edition, Pearson education.

Reference Books:

1. Computer Network, Natalia Olifer, Victor Olifer, Wiley-India edition.
2. Data and computer communication, William Stallings, Pearson
3. Local area Networks by Peter Hudson

Additional Materials

Web Resource

- <https://nptel.ac.in/courses/106105082/>
- <https://nptel.ac.in/downloads/106105080/>
- <https://www.youtube.com/watch?v=UXMlxCYZu8o>
- <https://youtu.be/pVl1L1jrbFE>
- <https://youtu.be/AmlOSGYkKXc>

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

CIE-Theory (60 Marks)	CIE-Practical (60 Marks)
Midsem- 40 Marks	Continuous Evaluation-20
Quiz: 10 Marks	Marks(Regularity)
Assignment - 05	Activity(paper,Workshop,seminar)- 20 Marks
Class Regularity - 05	Practical File: 20 Marks

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in internal component or less than 40% in the end semester will be considered for supplementary assessment in the respective components (i.e internal component or end semester) of semester concerned. Students must make themselves available

during the supplementary examination period to take up the respective components (internal component or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.

Do not share your work with other students (except where required for a group activity or assessment).

Course schedule (subject to change)

(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
Weeks 1	Basics of Data Communication System and its components, Computer network and its goals, Types of computer networks: LAN, MAN, WAN, ,	Understand basic computer network technology.	
Weeks 2	Wireless networks, Transmission media, Network software: concept of layers, protocols, interfaces and services, ISO-OSI reference model, TCP/IP reference model.	Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.	Assignment-1
Week 3	Design issues, Framing, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels,	Understand and explain Data Communications System and its components.	Quiz-1
Week 4	Static and dynamic channel allocation, Random Access: ALOHA, CSMA protocols, Controlled Access: Polling, Token Passing,	Identify the different types of network topologies and protocols.	
Week 5	IEEE 802.3 frame format, Manchester encoding, collision detection in 802.3, Binary exponential back off algorithm.	Understand and explain Data Communications System and its	Assignment-2

			components.	
	Week 6	Design issues, IPv4 classful and classless addressing, sub netting, Protocols: IP, ARP, RARP, ICMP	Identify the different types of network devices and their functions within a Network.	
	Week 7	Routing algorithms: distance vector and link state routing , shortest path algorithm, Routing protocols :IGMP, OSPF, RIP, BGP, flooding..	Identify the different types of network topologies and protocols.	
	Week 8	Elements of transport protocols, introduction to TCP/UDP protocols and their comparison. The TCP Service Model, The TCP Segment Header, The Connection Establishment, The TCP Connection Release, The TCP Connection Management Modeling	Enumerate the layers of the TCP/IP..	Test
	Week 9	The TCP Sliding Window Congestion control: Principles of Congestion Control, Congestion prevention policies, Leaky bucket and token bucket algorithms.	Enumerate the layers of the OSI model TCP/IP.	
	Week 10	Hyper Text Transfer Protocol (HTTP),	Identify the different types of network protocols.	

Week 11	Domain Name System (DNS), File Transfer Protocol (FTP),	Identify the different types of network protocols.	
Week 12	Dynamic Host Configure Protocol (DHCP)	Identify the different types of network protocols.	

