



# ISLAMIC UNIVERSITY OF TECHNOLOGY



## Course Outline and Course Plan

Name of the Teacher	Dr. Md. Sakhawat Hossen	Position	Associate Professor
Department	Computer Science and Engineering (CSE)	Programme	B.Sc. Engg.
Course Code	CSE 4511	Course Title	Computers Networks
Academic Year	2022-2023	Semester	Winter
Contact Hours	3	Credit Hours	3
Text books and Reference books	<ol style="list-style-type: none"> <li>1. TCP/IP Protocol Suite, Behrouz A Forouzan</li> <li>2. Computer Networks, Tanenbaum A S</li> <li>3. Computer Networking, A Top down Approach, Kurose and Ross</li> <li>4. Computer Networks a System Approach, Larry L. Peterson and Bruce S. Davie</li> </ol>	Authors of the books	<ol style="list-style-type: none"> <li>1. Behrouz A Forouzan</li> <li>2. Tanenbaum A S</li> <li>3. Kurose and Ross</li> <li>4. Larry L. Peterson and Bruce S. Davie</li> </ol>
Prerequisites (If any)	CSE 4405		
Course Homepage			
Teaching Methods/ Approaches	<input type="checkbox"/> Lecture✓ <input type="checkbox"/> Project✓	<input type="checkbox"/> Group discussion✓ <input type="checkbox"/> Others:	<input type="checkbox"/> Demonstration✓ <input type="checkbox"/> Problem solving✓
Teaching aids	Multi-media ✓	OHP	Board and Marker✓ Others

Course Assessment Method								
Attendance (10%)	Quiz 30% of Total Marks (Best 3 out of 4)						Mid Semester (25%)	Semester Final (35%)
	1 <sup>st</sup> Quiz	2 <sup>nd</sup> Quiz	3 <sup>rd</sup> Quiz	4 <sup>th</sup> Quiz	Others		Week/Date	Week/Date
	Week/Date	Week/Date	Week/Date	Week/Date	Assignment	Homework		
	4 <sup>th</sup> Week	6 <sup>th</sup> Week	10 <sup>th</sup> Week	13 <sup>th</sup> Week	2 Assignment s	Will be given time to time	8 <sup>th</sup> Week	16 <sup>th</sup> Week

Grading Policy					
Marks out of 100	Letter Grade	Grade Point	Marks out of 100	Letter Grade	Grade Point
80 - 100	A+	5.00	55 - 59	B-	3.75
75 - 79	A	4.75	50 - 54	C+	3.50
70 - 74	A-	4.50	45 - 49	C	3.25
65 - 69	B+	4.25	40 - 44	D	3.00
60 - 64	B	4.00	00 - 39	F	10.00

### Course Contents

Introduction to computer networks, Uses of computer networks, Network models, Network topology, Layered approach of networking protocols, Design issues of layers, and TCP/IP protocol suite.

Data link layer: Design issues; error control, detection and correction; Logical link control sub-layer, Medium access sub-layer; Multiple access protocols, Medium access mechanisms – ALOHA, slotted ALOHA, CSMA, CSMA/CD, CSMA/CA, WDMA; Medium access protocols – IEEE 802.3: Ethernet, IEEE 802.4: Token bus, IEEE 802.5: Token ring, Introduction to WiFi; High speed LANs, FDDI, Fast Ethernet, and Gigabit Ethernet; LAN extension – Bridges, Switches, and VPN.

Network layer: IP addressing, IP packet forwarding, Subnetting, CIDR, Internet protocol, ICMP, ARP, RARP, DHCP, and IPv6 overview; Routing protocols

Transport layer: Functionalities; User datagram protocol (UDP) – UDP operations and UDP package modules, Transmission control protocol (TCP) – TCP features, TCP Connection establishment and termination, TCP Flow control and error control, Congestion control, SCTP Overviews

Application layer: DNS, Electronic mail (SMTP, POP, IMAP), FTP, WWW.

Networks and Internet Security Overviews.

### Course Objectives

The subject aims to equip the student with such that after completion to the course the students should be able to do the followings:

1. Use computer networks vocabulary appropriately when discussing issues with other networking professionals.
2. Understand and be able to explain the working principles of wired and wireless LANs; be able to describe the different component/layers of the physical networks.
3. Understand, explain different protocols running in different layers of the TCP/IP protocol suite
4. Describe the principles of different routing algorithms.
5. Familiar themselves to basic protocols and infrastructure of computer network, introduce themselves to advanced communication and networking concepts, and prepare themselves for the advanced courses in the area of data communication and networking.

### Mapping with CO, PO and Bloom's Taxonomy

CO No.	Course Outcomes (CO) Statement	Levels of Bloom's Taxonomy	Matching with Program Outcome (PO)
CO1	Describe the basic layers of the TCP/IP protocol suite so that the system function of different physical network can be identified and described.	C1	PO1
CO2	Explain different versions of Internet Protocol (IPv4, IPv6) along with other companion protocols (ARP, ICMP, IGMP) and different transport layer protocols (TCP, UDP) those are facilitating data communication over different types of computer network.	C2	PO1, PO2
CO3	Describe the basic principles of different routing algorithms so that appropriate packet forwarding techniques of different routing protocols can be understood and their relative advantages and disadvantages can be identified.	C3	PO1, PO2
CO4	Comprehend a computer network architecture/topography so that its different components and functions can be identified and described	C2	PO2

Weekly plan for course content and mapping with CO		
Weeks	Topics	COs
1	Introduction to computer networks, Uses of computer networks, Network models, Network topology, Layered approach of networking protocols, Design issues of layers, and TCP/IP protocol suite, Data link layer design issues; error control, detection and correction;	CO1
2	Medium access mechanisms – ALOHA, slotted ALOHA, CSMA, CSMA/CD, CSMA/CA,	CO1
3	Medium access protocols – IEEE 802.3: Ethernet, IEEE 802.4: Token bus, IEEE 802.5: Token ring, High speed LANs, FDDI, Fast Ethernet, and Gigabit Ethernet	CO1
4	Introduction to IEEE 802.11(WiFi); IEEE 802.15 (Bluetooth)	CO1
5	LAN extension – Bridges, Switches, and VPN	CO1
6	Network layer: IP addressing, IP packet forwarding, Subnetting, CIDR, NAT	CO2
7	IPv4 protocol, ICMP, ARP, RARP, DHCP, Mobile IP	CO2
8	Unicast Routing protocols/ Algorithms (RIP, OSPF, BGP)	CO3
9	IPv6 Addressing, IPv6 Protocol	CO2
10	Transport layer functionalities; User datagram protocol (UDP) – UDP operations and UDP package modules	CO2
11	Transmission control protocol (TCP) – TCP features, TCP Connection establishment and termination	CO2
12	TCP Flow control and error control, Congestion control,	CO2
13	Stream Control Transmission Protocol (SCTP) Overview, Feature, Services	CO2
14	Stream Control Transmission Protocol (SCTP) Association, error control, flow control and congestion control	CO2
15	Network and Internet Security: Basic security mechanisms, Basic concept of Cryptography (Encryption and Decryption), User Authentication and Key management	CO4

16	Final Examinations	--
17		
Program Outcomes		
PO 1	<b>Engineering Knowledge:</b> Apply knowledge of <b>mathematics, natural science, engineering</b> fundamentals and system fundamentals, software development, networking & communication, and information assurance & security to the solution of complex engineering problems in computer science and engineering.	
PO 2	<b>Problem Analysis:</b> Ability to <b>identify, formulate</b> and <b>analyze complex</b> Computer Science and Engineering problems in the areas of hardware, software, theoretical Computer Science and applications to reach significant conclusions by applying Mathematics, Natural sciences, Computer Science and Engineering principles.	
PO 3	<b>Design/ Development of Solutions:</b> <b>Design solutions</b> for complex computer science and engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.	
PO 4	<b>Investigation:</b> Ability to use <b>research based knowledge</b> and <b>research methods</b> to perform literature survey, design experiments for complex problems in designing, developing and maintaining a computing system, collect data from the experimental outcome, analyze and interpret valid/interesting patterns and conclusions from the data points.	
PO 5	<b>Modern Tool Usage:</b> Ability to create, select and apply <b>state of the art tools</b> and techniques in designing, developing and testing a computing system or its component.	
PO 6	<b>The Engineer and Society:</b> Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to <b>professional engineering practice</b> in system development and solutions to <b>complex engineering problems</b> related to system fundamentals, software development, networking & communication, and information assurance & security.	
PO 7	<b>Environment and Sustainability:</b> Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to <b>professional engineering practice</b> in system development and solutions to <b>complex engineering problems</b> related to system fundamentals, software development, networking & communication, and information assurance & security.	
PO 8	<b>Ethics:</b> Apply <b>ethical principles</b> and commit to <b>professional ethics</b> and <b>responsibilities</b> and norms of computer science and engineering practice.	
PO 9	<b>Individual Work and Teamwork:</b> Ability to function as an individual and as a team player or leader in multidisciplinary teams and strive towards <b>achieving a common goal</b> .	
PO 10	<b>Communication:</b> <b>Communicate effectively</b> 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.	
PO 11	<b>Project Management and Finance:</b> Demonstrate knowledge and understanding of engineering management principles and economic decision making and apply these to one's own work, as a member and leader in a team, to <b>manage projects</b> and in multidisciplinary environments.	
PO 12	<b>Life-long learning:</b>	

	Recognize the need for, and have the preparation and ability to <b>engage in independent and lifelong learning</b> in the broadest context of technological change.
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Mapping of COs and POs [Correlation level 1 for low, 2 for moderate and 3 for high]												
Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	3	3										
CO3	3	3										
CO4			1	1								

**Student's consulting hour: Monday 2:00 PM to 2:30 PM**

**Course Teacher contact details:**

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