

University of Asia Pacific (UAP)
Department of Computer Science & Engineering (CSE)

Course Outline: CSE 319

Program:	Computer Science & Engineering
Course Title:	Computer Networks
Course Code:	CSE 319
Semester:	Fall 2020
Level:	3-2 (A, B)
Credit Hour:	3.0
Name & Designation of Teacher:	Dr. A S M Touhidul Hasan, Assistant Professor
Office/Room:	
Class Hours:	Monday (2:00 – 3:20) PM <i>Sec B</i> , Tuesday (2:00 – 3:20) PM <i>Sec A</i> , Wednesday (9:30 – 10:50) AM, <i>Sec A</i> , Wednesday (11:00 AM – 12:20 PM) <i>Sec B</i>
Consultation Hours:	Sunday (11:00 AM – 12:20 PM) <i>Sec A</i> , Tuesday (12:30 – 1:50) PM, <i>Sec B</i>
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Rationale:	It will help to understand the core computer networking and its application in modern technology.
Pre-requisite:	CSE 303 (Data Communication)
Course Synopsis:	This course covers computer networks concepts, Internet, application layer, transport layer protocols, network layer and routing, data link layer, networks security, IoT applications, cloud computing, and blockchain.
Course Objectives:	<p>The objectives of this course are to:</p> <ol style="list-style-type: none">1. Build an understanding of the fundamental concepts of computer networking and its applications2. Familiarize the student with the concept of different TCP/IP layers, i.e., Application, Transport, Networking, Datalink, and Physical layers and its functionality during

communications layers and its functionality during communications

3. **Introduce** the student of addressing mechanisms in different TCP/IP layers, i.e., port addressing, IP addressing, and MAC addressing advanced networking concepts, preparing the student for Advanced applications of computer networking
4. **Allow** the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks, Wireless and mobile networking, network security and application of cryptography, cloud computing, and blockchain

Course Outcomes (CO) and their mapping with Program outcomes (PO) and Teaching-Learning Assessment methods:

CO No.	CO Statements: Upon successful completion of the course, students should be able to:	Corresponding POs (Appendix-1)	Bloom's taxonomy domain/level (Appendix-2)	Delivery methods and activities	Assessment Tools
CO1	Demonstrate the concept of Computer Networking and its applications.	1	Apply (Cognitive)	Live Video Lecture, PPT Presentation	Online Quiz, Short Question written exam, Oral Exam
CO2	Examine the concept of different networking layers and its functionality during message transfer.	2	Apply (Cognitive)	Live Video Lecture, PPT Presentation	Open book exam, Oral Exam
CO3	Discover the operation of addressing mechanisms in different layers, i.e., port addressing, IP addressing, and MAC addressing, application of different networking and routing protocols and congestion.	5	Analyze (Cognitive)	Live Video Lecture, Problem Solving, Group discussion	Open book exam, Individual Assignment, Oral Exam
CO4	Evaluate the Wireless and mobile networking, network security and application of cryptography.	3	Evaluate (Cognitive)	Live Video Lecture, Problem Solving	Open book exam, Oral Exam
CO5	Determine the power of green computing such as cloud and virtualization, blockchain, IoT.	7	Evaluate (Cognitive)	Live Video Lecture, Problem Solving	Open book exam, Group Project, Oral Exam
CO6	Develop the survey of research opportunities in the different areas of computer networking fields.	3	Create (Cognitive)	Live Video Lecture, Online Presentation	Assignment writing, Oral Exam

Weighting COs with Assessment methods:

Assessment Type	% weight	CO1	CO2	CO3	CO4	CO5	CO6
Final Exam will be based on time-bound open book exam, online quiz and oral exam	50%	10	10	10	10	10	
Mid Term will be based on time-bound open book exam, online quiz and oral exam	20%	6.67	6.67	6.67			
Class performance, Online Quizzes, Presentation, case study, open book exam, Assignment, Project.	30%	3.75	3.75	3.75	3.75	5	10
Total	100%	20.42	20.42	20.42	13.75	15	10

Grading Policy: As per the approved grading policy of UAP (Appendix-3)

Course Content Outline and mapping with COs

Lecture	Topics / Content	Course Outcome	Delivery methods and activities	Reading Materials
1	Internet, network edge, end systems, access networks, links, network core, packet switching, circuit switching, network structure	CO1	Live Video Lecture, PPT Presentation	Computer Networking A Top-Down Approach Ch-1
2	delay, loss, throughput in networks, protocol layers, service models, networks under attack: security, history	CO1	Live Video Lecture, PPT Presentation	Computer Networking A Top-Down Approach Ch-1
3	principles of network applications, Web and HTTP	CO2	Live Video Lecture, PPT Presentation, Group discussion,	Computer Networking A Top-Down Approach Ch-2

			problem Solving	
4	FTP, electronic mail, SMTP, POP3, IMAP, DNS	CO2	Live Video Lecture, PPT Presentation, Group discussion, problem Solving	Computer Networking A Top-Down Approach Ch-2
5	socket programming with UDP and TCP, wireshark	CO2	Live Video Lecture, PPT Presentation, problem solving	Computer Networking A Top-Down Approach Ch-2
6	transport-layer services, multiplexing and demultiplexing, connectionless transport: UDP	CO2	Live Video Lecture, PPT Presentation Lecture, Problem solving	Computer Networking A Top-Down Approach Ch-3
7	principles of reliable data transfer, rdt1.0: reliable transfer over a reliable channel, rdt2.0: channel with bit errors, rdt2.1: sender, handles garbled ACK/NAKs	CO2	Live Video Lecture, PPT Presentation, Problem solving	Computer Networking A Top-Down Approach Ch-3
8	principles of reliable data transfer, rdt2.2: a NAK-free protocol, rdt3.0: channels with errors and loss, pipelined protocols	CO2	Live Video Lecture, PPT Presentation, Problem solving	Computer Networking A Top-Down Approach Ch-3
9	connection-oriented transport: TCP, segment structure, reliable data transfer, flow control, connection management	CO3	Live Video Lecture, PPT Presentation, Problem solving	Computer Networking A Top-Down Approach Ch-3
10	principles of congestion control, TCP congestion control	CO3	Live Video Lecture, PPT Presentation, Problem solving	Computer Networking A Top-Down Approach Ch-3
11	introduction to network layer, virtual circuit and datagram networks	CO3	Live Video Lecture, PPT Presentation, problem solving, group discussion	Computer Networking A Top-Down Approach Ch-4
12	router, what's inside a router	CO3	Live Video Lecture, PPT Presentation, problem solving, group discussion	Computer Networking A Top-Down Approach Ch-4

13	Internet Protocol, datagram format, IPv4 addressing	CO3	Live Video Lecture, PPT Presentation, problem solving, group discussion	Computer Networking A Top-Down Approach Ch-4
14	Internet Protocol, ICMP, IPv6	CO3	Live Video Lecture, PPT Presentation, problem solving, group discussion	Computer Networking A Top-Down Approach Ch-4
15	outing algorithms, link state, distance vector	CO3	Live Video Lecture, PPT Presentation, problem solving, group discussion	Computer Networking A Top-Down Approach Ch-4
16	routing algorithms, link state, distance vector, hierarchical routing, routing in the Internet, RIP, OSPF, BGP	CO3	Live Video Lecture, PPT Presentation, problem solving, group discussion	Computer Networking A Top-Down Approach Ch-4
17	introduction to link layer, services, error detection, correction, multiple access protocols	CO3	Live Video Lecture, PPT Presentation, problem solving, group discussion	Computer Networking A Top-Down Approach Ch-5
18	LANs, addressing, ARP, Ethernet, switches, VLANS	CO3	Live Video Lecture, PPT Presentation, problem solving, group discussion	Computer Networking A Top-Down Approach Ch-5
19	link virtualization: MPLS, data center networking, a day in the life of a web request	CO3	Live Video Lecture, PPT Presentation, problem solving, group discussion	Computer Networking A Top-Down Approach Ch-5
20	What is network security? Principles of cryptography	CO4	Live Video Lecture, PPT Presentation, problem solving, group discussion	Computer Networking A Top-Down Approach Ch-8
21	Principles of cryptography, Message integrity, authentication	CO4	Live Video Lecture, PPT Presentation, problem solving, group discussion	Computer Networking A Top-Down Approach Ch-8
22	Securing TCP connections: SSL	CO4	Live Video Lecture, PPT Presentation, problem solving, group discussion	Computer Networking A Top-Down Approach Ch-8

23	Green Computing: Understanding Cloud Fundamentals, Digging Deeper into IaaS and PaaS, Diving into Cloud Economics, Managing Cloud Workloads and Services, Improving Security, Governance, and Cloud Reliability	CO5	Presentation and group discussion	Cloud Services For Dummies, IBM Limited Edition
24	Grasping Blockchain Fundamentals, Taking a Look at How Blockchain Works, Propelling Business with Blockchain, Blockchain in Action: Use Cases	CO5	Research paper presentation	Blockchain for Dummies, IBM Limited Edition
25	Wireless, Wireless links, characteristics, CDMA, IEEE 802.11 wireless LANs (“Wi-Fi”), Cellular Internet Access architecture, standards (e.g., GSM)	CO4	Live Video Lecture, PPT Presentation, problem solving, group discussion	Computer Networking A Top-Down Approach Ch-6
26	Mobility, Principles: addressing and routing to mobile users, Mobile IP, Handling mobility in cellular networks, Mobility and higher-layer protocols	CO4	Live Video Lecture, PPT Presentation, problem solving, group discussion	Computer Networking A Top-Down Approach Ch-6
27	Introduction to networking research and opportunities	CO6	Live Video Lecture, PPT Presentation, problem solving, group discussion	Internet sources
28	Discussion on recent networking field research papers	CO6	Live Video Lecture, PPT Presentation, problem solving, group discussion	Related publications

Required Reference(s): **(1)** Computer Networking A Top-Down Approach (CNA)
 - *James F. Kurose*

Recommended Reference(s): **(1)** Computer Networks
 - *ANDREW S. TANENBAUM*
 (2) Cloud Services For Dummies, IBM Limited Edition
 (3) Blockchain for Dummies, IBM Limited Edition by Manav Gupta

Special Instructions:

- Minimum Required Attendance: 70% class attendance is mandatory for a student in order to appear at the final examination.

- Late presence: Consecutive two days late presence in the class will be counted as one day absent
- Assignment submission rules: Have to submit before the midnight of the submission date through email.

Prepared by	Checked by	Approved by
Course Teacher	Chairman, PSAC committee	Head of the Department

Appendix-1:

Washington Accord Program Outcomes (PO) for engineering programs:

No.	PO	Differentiating Characteristic
1	Engineering Knowledge	Breadth and depth of education and type of knowledge, both theoretical and practical
2	Problem Analysis	Complexity of analysis
3	Design/ development of solutions	Breadth and uniqueness of engineering problems i.e. the extent to which problems are original and to which solutions have previously been identified or codified
4	Investigation	Breadth and depth of investigation and experimentation
5	Modern Tool Usage	Level of understanding of the appropriateness of the tool
6	The Engineer and Society	Level of knowledge and responsibility
7	Environment and Sustainability	Type of solutions.
8	Ethics	Understanding and level of practice
9	Individual and Team work	Role in and diversity of team
10	Communication	Level of communication according to type of activities performed
11	Project Management and Finance	Level of management required for differing types of activity
12	Lifelong learning	Preparation for and depth of Continuing learning.

Generic Skills (Detailed):

1. **Engineering Knowledge (T)** -Apply knowledge of mathematics, sciences, engineering fundamentals and manufacturing engineering to the solution of complex engineering problems;
2. **Problem Analysis (T)** – Identify, formulate, research relevant literature and analyze complex engineering problems, and reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences;
3. **Design/Development of Solutions (A)** –Design solutions, exhibiting innovativeness, for complex engineering problems and design systems, components or processes that meet specified

needs with appropriate consideration for public health and safety, cultural, societal, economical, ethical, environmental and sustainability issues.

4. **Investigation (D)** Conduct investigation into complex problems, displaying creativeness, using research-based knowledge, and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions;
5. **Modern Tool Usage (A & D)** -Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities, with an understanding of the limitations;
6. **The Engineer and Society (ESSE)** -Apply reasoning based on contextual knowledge to assess societal, health, safety, legal, cultural, contemporary issues, and the consequent responsibilities relevant to professional engineering practices.
7. **Environment and Sustainability (ESSE)** -Understand the impact of professional engineering solutions in societal, global, and environmental contexts and demonstrate knowledge of and need for sustainable development;
8. **Ethics (ESSE)** –Apply professional ethics with Islamic values and commit to responsibilities and norms of professional engineering code of practices.
9. **Communication (S)** -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;
10. **Individual and Team Work (S)** -Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
11. **Life Long Learning (S)** -Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
12. **Project Management and Finance (S)** -Demonstrate knowledge and understanding of engineering management and financial principles and apply these to one's own work, as a member and/or leader in a team, to manage projects in multidisciplinary settings, and identify opportunities of entrepreneurship.

Appendix-2

Bloom's Taxonomy (Taxonomy of Learning) **3 Domains**

(1)	(2)	(3)
Cognitive (Knowledge)	Psychomotor (Skill)	Affective (Attitude)
Remember	Imitation	Receiving
Understand	Manipulation	Responding
Apply	Precision	Valuing
Analyze	Articulation	Organization
Evaluate	Naturalization	Characterization
Create		

Appendix-3: Grading Policy

Numeric Grade	Letter Grade	Grade Point
80% and above	A+	4.00
75% to less than 80%	A	3.75
70% to less than 75%	A-	3.50
65% to less than 70%	B+	3.25
60% to less than 65%	B	3.00
55% to less than 60%	B-	2.75
50% to less than 55%	C+	2.50
45% to less than 50%	C	2.25
40% to less than 45%	D	2.00
Less than 40%	F	0.00