



Independent University, Bangladesh

Department of Computer Science & Engineering

Course Title: Data Communication and Networking

Course Code: CSE 316

Semester: Summer 2024

PART A - INTRODUCTION

Course:

Course Type: Major

Prerequisite: CSE 211 + Lab: Algorithms

Instructor's Details:

Mohammad Faisal Uddin, Ph.D.

Associate Professor

Office Room: BC 5001F [for consultation hours check faculty's homepage at IUB website]

Email: faisal@iub.edu.bd

Course Content:

Data Communications, Communications components, Different Network Topologies, Different type of networks: LAN, WAN, MAN, Switching: Circuit switching vs. Packet switching, Protocol layering, TCP/IP protocol suite, Layers of TCP/IP protocol suite, Multiplexing De-multiplexing, The OSI model, Routing and Forwarding, Routing Approach: Connectionless Service, Virtual-Circuit Approach: Connection-Oriented Service, Network-layer Performance, Address Space, Classful Addressing, Classless Addressing, DHCP, NAT, Forwarding Based on Destination Address/Label, Link-layer addressing, ARP, Transport-Layer Services: Connectionless and Connection-Oriented Protocols, Stop-and-Wait Protocol, Go-Back-N Protocol, Selective-Repeat Protocol, Analog and Digital Signals, Periodic and Non-periodic Signals, Time and Frequency Domains, Transmission of Digital Signals, Nyquist Bit Rate, Shannon Capacity, Application-Layer Paradigms, Application Programming Interface, Using Services of the Transport Layer, Iterative Communication Using UDP, Iterative Communication Using TCP, Concurrent Communication, Iterative Programing.

Course Objective:

- a. Learn basic networking concepts
- b. Serve as a prelude to the formal networking class

Course Policy:

- a. It is the student's responsibility to gather information about the assignments and cover topics during the lectures missed. Regular class attendance is mandatory. According to IUB system, students must enter the classroom within the first 10 minutes to get the attendance submitted.
- b. The approximate time and syllabus of quiz, midterm, and final exam are already given here; however, announcements will be given ahead of time as well.
- c. There will be no make-up for quizzes and assignments. Missed assignments and quizzes will result in a grade of zero. Make-ups for Midterm Exams will be available if and only if you have a legitimate reason for missing the exam. In case of an illness or emergency, you must supply formal documentation that supports your claim.

Administrative Policy:

- a. All announcements will be made available via [google classroom](#).
- b. The lecture notes, reading materials, codes, or other resources will be made available prior to the discussion on that material in class so that students may have a cursory look into the materials. Students are recommended to get a printed copy of the lecture note to keep notes.
- c. Class participation is vital for a better understanding of Hardware concepts. Moreover, this is considered an indicator of a good learner.
- d. Students are invited to raise questions at any point during the lecture.
- e. Students should take tutorials with the teaching assistant and/or instructor during office hours. Prior appointment is required.

Academic Dishonesty:

- a. A student who cheats plagiarizes, or furnishes false, misleading information in the course is subject to disciplinary action up to and including an **F grade** in the course and/or suspension/expulsion from the University.
- b. Students must maintain the code of IUB.
- c. No collaboration whatsoever is permitted during the examination.
- d. Plagiarism and other anti-intellectual behavior cannot be tolerated in any academic environment that prides itself on individual accomplishment. If you have any questions about the collaboration policy, or if you feel that you may have violated the policy, please talk to one of the course staff. Although the course staff is obligated to deal with cheating appropriately, we are more understanding and lenient if we find out from the transgressor himself or herself rather than from a third party or by ourselves.

Non-Discrimination Policy:

The course and University policy prohibit discrimination on the basis of race, color, religion, sex, marital or parental status, national origin or ancestry, age, mental or physical disability, sexual orientation, or military status. If you see either the course instructor or any other person related to the course showing any form of discrimination, please inform the proctor's office of the wrongdoing.

Program Learning Outcome (PLO/PO) Applied:

PO	Title	Description
PO1	Engineering Knowledge	Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in K1 to K4 respectively to the solution of complex engineering problems.
PO2	Problem Analysis	Identify, formulate, research literature and analyses complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

Course Outcomes (COs), Program Outcomes (POs) and Assessment:

CO	CO Statement	PO	Domain	Level of Learning Taxonomy	Assessment Tools
C01	Learn basic networking protocols	PO1	Cognitive	Level 4	1. Midterm 2. Final
C02	Able to design and analyze different network/routing protocol	PO2	Psychomotor	Level 5	1. Laboratory Work 2. Laboratory Assignments

PART B - CONTENT OF THE COURSE**Class & Exam Schedule, Topics and Readings:**

Week	Lectures	Lecture Outcome	Readings	CO
Week 1	1. Introduction- Data Communications 2. Introduction- Computer Networks	1. Basic understanding of Data Communications and Computer Networks- Different type of networks - LAN, WAN 2. Switching: Circuit switching vs Packet switching; Internet history	Forouzan Ch. 1.1-1.5 + Class Lecture	C01
Week 2	1. Network Models - Protocol Layering 2. Network Models - TCP/IP, OSI Protocol Suite	1. Protocol layering 2. TCP/IP protocol suite 3. Layers of TCP/IP protocol suite 4. Multiplexing Demultiplexing 5. The OSI model	Forouzan Ch. 2.1-2.3 + Class Lecture	C01
Week 3	1. Network Layer Services 2. Network Layer Performance	1. Packetizing 2. Routing and Forwarding 3. Other Services 4. Network-layer Performance 5. Delay 6. Throughput 7. Packet Loss 8. Congestion Control	Forouzan Ch. 18.1-18.3 + Class Lecture	C01

Week 4	<ol style="list-style-type: none"> 1. Network Layer Addressing 2. Address Space & Address Depletion 	<ol style="list-style-type: none"> 1. IP Address Space 2. Classful Addressing 3. Classless Addressing 	Forouzan Ch. 18.4 + Class Lecture	CO1
Week 5	<ol style="list-style-type: none"> 1. Solution to Address Depletion Problem - Subnet Mask 2. Block Allocation 	<ol style="list-style-type: none"> 1. Subnet Mask 2. IPv4 Block Allocation 	Forouzan Ch. 18.4 + Class Lecture	CO1
Week 6	<ol style="list-style-type: none"> 1. Solution to Address Depletion Problem - DHCP, NAT 2. IPv4 Routing 	<ol style="list-style-type: none"> 1. Dynamic Host Configuration Protocol (DHCP) 2. Network Address Resolution (NAT) 3. Forwarding Based on Destination Address 	Forouzan Ch.18.4, 18.5 + Class Lecture	CO1
Week 7	MIDTERM		Forouzan Ch- 1, 2, 18 + Class Lectures	CO1
Week 8	<ol style="list-style-type: none"> 1. Solution to Address Depletion Problem - IPv6 Addressing 2. Introduction to Data-Link Layer 	<ol style="list-style-type: none"> 1. IPv6 Addressing 2. Data Link Layer Services 3. Data Link Sublayers 	Forouzan Ch- 22.1, 9.1 + Class Lecture	CO1
Week 9	<ol style="list-style-type: none"> 1. Link Layer Addressing 2. Transport Layer - Introduction & Addressing 	<ol style="list-style-type: none"> 1. Address Resolution Protocol (ARP) 2. Process-to-Process Communication 3. IP Addressing vs Port Numbers 	Forouzan Ch- 9.2, 23.1 + Class Lecture	CO1
Week 10	<ol style="list-style-type: none"> 1. Transport Layer Services 2. Transport Layer Protocols 	<ol style="list-style-type: none"> 1. Transport Layer Services 2. Connectionless vs Connection-Oriented Protocols 3. Flow Control, Sequence Numbers & Sliding windows 	Forouzan Ch- 23.1 + Class Lecture	CO1

Week 11	<ol style="list-style-type: none"> 1. Transport Layer Protocols - Connectionless and Connection Oriented Protocols (SW, GBN) 2. Transport Layer Protocols - Connection Oriented Protocols (SR) 	<ol style="list-style-type: none"> 1. Simple Protocol 2. Stop-and-Wait Protocol 3. Pipelining 4. Go-Back-N Protocol (GBN) 5. Selective-Repeat Protocol 6. Bidirectional Protocols: Piggybacking 	Forouzan Ch- 23.2 + Class Lecture	CO1
Week 12	<ol style="list-style-type: none"> 1. Introduction to Physical Layer & Digital Signals 2. Transmission Impairment, Data Rate Limits & Performance 	<ol style="list-style-type: none"> 1. Analog and Digital Signals 2. Time and Frequency Domains 3. Bit Rate 4. Bit Length 5. Noiseless Channel: Nyquist Bit Rate 6. Noisy Channel: Shannon Capacity 7. Using Both Limits 8. Bandwidth 9. Throughput 10. Latency (Delay) 11. Bandwidth-Delay Product 12. Jitter 	Forouzan Ch- 3 + Class Lecture	CO1
Week 13	FINAL		Comprehensive Forouzan Ch- 1, 2, 18, 22, 9, 23, 3 + Class Lectures	CO1

PART C - ASSESSMENT AND EVALUATION

Assessment Pattern:

- Quizzes: A total of 4 quizzes will be taken. 2 from the syllabus of the midterm and 2 from the syllabus of the final.
- Assignments: Assignments will be given.

CIE - Continuous Internal Evaluation (25 Marks):

Blooms Category	Assignment (5)	Quizzes (20)
Remember	5	
Understand		10
Apply		5
Analyze		5
Evaluate		
Create		

SMEE - Semester Mid & End Examination (75 Marks):

Blooms Category	Midterm (30)	Final (45)
Remember	5	
Understand	5	5
Apply	5	10
Analyze	5	10
Evaluate	10	10
Create		10

Assessment and Evaluation Distribution:

Students will be assessed on the basis of their overall performance in all the exams, class tests, assignments, project presentation, and class participation. The final numeric reward will be the compilation of:

- Assignment (5%)
- Quizzes (20%)
- Midterm (30%)
- Final (45%)

Grade Conversion Scheme:

The following chart will be followed for final grading for this course. [Numbers are inclusive]:

A	A-	B+	B	B-	C+	C	C-	D+	D	F
90-100	85-89	80-84	75-79	70-74	65-69	60-64	55-59	50-54	45-49	0-44

PART D - LEARNING RESOURCES

Required Text (Mandatory):

The course will be based mostly on the following book:

- a. Behrouz Forouzan, Data Communications and Networking, 5th Ed., McGraw-Hill

Reference Materials:

Following is an optional reference material to study and know more about the topics:

- a. Wayne Tomasi, Introduction to Data Communications and Networking, Pearson