Independent University, Bangladesh
Department of Computer Science and Engineering

Course Outline

Course Title: Data Communication & Networking
Course Code: CSE 316 / CSC 430 / CSC 430, Summer 2019
Room- GPL

Instructor's details:

Dr. Faisal M. Uddin
Asst. Professor
Office: 7007 (New Building)
Visiting Hours: S/T: 12:00-13:30 (or by appointment)
Email: faisal@iub.edu.bd

Prerequisite : CSE 213 + Lab/ CSC 305 + Lab/ CEN 305 + Lab: Object-Oriented Programming

Mandatory : Should be registered for CSE 316L/CSC 430L/CSC 430L concurrently.
TA : Mohammed Rakibur Rahman Ranak

Course Description:

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/Lebel, 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.

Attendance Policy:

1. It is the student's responsibility to gather information about the assignments and covered topics during the lectures missed. Although there are no points for class attendance, regular class attendance is very important. Without 70% of attendance, sitting for final exam is NOT allowed. According to IUB system students must enter the classroom before the class teacher to get attendance counted.
2. The date and syllabus of quizzes, midterm and final exam will be announced in the class ahead of time in the class. There is NO provision for make-up exams.

Administrative Policy:

1. All announcements will be made available via www.piazza.com. Students have to enroll to this course by themselves.
2. Piazza Access Code: **CSE316SUMMER2019**
3. The lecture notes, reading materials or other resources will be made available prior to the discussion on that material in class so that student may have a cursory look into the materials. Students are recommended to get a printed copy of the lecture note to keep note.
4. Class participation is vital for better understanding of technological issues. Students are invited to raise questions in any point during the lecture.
5. Students may consult with the teaching assistant and/or instructor during the office hours. Prior appointment is required.

Academic Dishonesty:

1. 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.
2. Students must maintain the IUB code of conduct and ethical guidelines offered by the School of Engineering & Computer Science.
3. The goal of homework is to give you practice in mastering the course material. Consequently, you are encouraged to collaborate on problem sets. In fact, students who form study groups generally do better on exams than do students who work alone. If you do work in a study group, however, you owe it to yourself and your group to be prepared for your study group meeting. Specifically, you should spend some time trying to solve each problem beforehand by yourself. If your group is unable to solve a problem, talk to other groups or ask your instructor or teaching assistant assigned to your class.
4. Assignment **must be** submitted on time. Late submission will not be accepted.
5. **No collaboration whatsoever is permitted during examination.**
6. 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.
7. Anything can change according to the circumstances.

Non-Discrimination Policy:

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

Evaluation Method:

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

• **Homework/Assignment (total of 4)**	**4%**
• **Quiz/Class Test (total of 4)**	**16%**
• **Mid-term Exam**	**25%**
• **Final Exam**	**40%**
• **Lab Performance**	**15%**
Total	**100%**

Grade Conversion Scheme:

The following chart will be followed for final grading. This can be customized from the guideline provided by the Department of Computer Science & Engineer.

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	<45

Reference Text Book(s):

The course will be based mostly on the following books [some other books and journals may be referred time to time]:

- Data Communications and Networking By: Behrouz A. Forouzan McGraw-Hill, 5th Ed. **(Mandatory).**
- Introduction to Data Communications and Networking by Wayne Tomasi (Optional).

Audit:

Students who are willing to audit the course are welcome during the first two classes and are advised to contact the instructor after that.

University Regulation and Code of Conduct:

Please see the Green Book for further information about academic regulation and policies, including withdrawal and grading, appeals and penalties for plagiarism and academic misconduct.

Students with Disabilities:

Students with disabilities are required to inform the Department of Electrical and Electronic Engineering of any specific requirement for classes or examination as soon as possible.

Class & Exam Schedule, Topics and Readings:

Sessions	Topics	Learning Outcome	Readings
Session – 1	Introduction to Data Communication Networks	1. Students will get familiar with each other 2. Students will learn the course policy 3. Students will learn the key concepts of Communication Networks	Course Outline & Ch-1 (Forouzan)
Session – 2	Introduction	1. Data Communications 2. Communications components 3. Data Representation 4. Data flow 5. Different Network Topologies	Ch-1 (Forouzan)
Session – 3	Introduction	1. Different type of networks 2. LAN, WAN 3. Switching: Circuit switching vs Packet switching 4. Internet history	Ch-1 (Forouzan)

Session – 4	Network Models	1. Protocol layering 2. TCP/IP protocol suite	Ch-2 (Forouzan)
Session – 5	Network Models	1. Layers of TCP/IP protocol suite 2. Multiplexing Demultiplexing 3. The OSI model	Ch-2 (Forouzan)
Session – 6	Network Layer	1. Packetizing 2. Routing and Forwarding 3. Other Services 4. Datagram ApproachVirtual-Circuit Approach: Connection-Oriented Service	Ch-18 (Forouzan)
Session – 7	Network Layer	1. Network-layer Performance: 2. Delay 3. Throughput 4. Packet Loss 5. Congestion Control	Ch-18 (Forouzan)
Session – 8	Network Layer	1. Address Space 2. Classful Addressing 3. Classless Addressing	Ch-18 (Forouzan)
Session – 9	Network Layer	1. Dynamic Host Configuration Protocol (DHCP) 2. Network Address Resolution (NAT)	Ch-18 (Forouzan)
Session – 10	Network Layer	1. Forwarding Based on Destination Address	Ch-18 (Forouzan)
Session – 11	Network Layer	1. Forwarding Based on Label 2. Routers as Packet Switches	Ch-18 (Forouzan)
Session – 12	**Mid-term test**	**Class Time**	Forouzan: Ch-1, 2, 18
Session – 13	Data-Link Layer	1. Introduction 2. Link-layer addressing 3. Address Resolution Protocol (ARP)	Ch-9 (Forouzan)
Session – 14	Transport Layer	1. Transport-Layer Services 2. Connectionless and Connection-Oriented Protocols	Ch-23 (Forouzan)
Session – 15	Transport Layer	1. Simple Protocol 2. Stop-and-Wait Protocol	Ch-23 (Forouzan)
Session – 16	Transport Layer	1. Go-Back-N Protocol (GBN) 2. Selective-Repeat Protocol 3. Bidirectional Protocols: Piggybacking	Ch-23 (Forouzan)
Session – 17	Physical Layer	1. Analog and Digital Data 2. Analog and Digital Signals 3. Periodic and Non-periodic Signals	Ch-3 (Forouzan)
Session – 18	Physical Layer	1. Sine Wave 2. Phase 3. Wavelength 4. Time and Frequency Domains 5. Composite Signals 6. Bandwidth	Ch-3 (Forouzan)
Session – 19	Physical Layer	1. Bit Rate 2. Bit Length 3. Digital Signal as a Composite Analog Signal 4. Transmission of Digital Signals	Ch-3 (Forouzan)

Session – 20	Physical Layer	1. Noiseless Channel: Nyquist Bit Rate 2. Noisy Channel: Shannon Capacity 3. Using Both Limits 4. Bandwidth 5. Throughput 6. Latency (Delay) 7. Bandwidth-Delay Product 8. Jitter	Ch-3 (Forouzan)
Session – 21	Application Layer	1. Providing Services 2. Application-Layer Paradigms 3. Application Programming Interface 4. Using Services of the Transport Layer	Ch-25 (Forouzan)
Session – 22	Application Layer	1. Iterative Communication Using UDP 2. Iterative Communication Using TCP 3. Concurrent Communication 4. Iterative Prog. Using UDP (C) 5. Iterative Prog. Using TCP (C)	Ch-25 (Forouzan)
Session – 23	Application Layer	1. Addresses and Ports 2. Iterative Programming Using UDP (JAVA) 3. Iterative Programming Using TCP (JAVA)	Ch-25 (Forouzan)
Session – 24	Review	Review	
Session – 25	**Final Exam**	**Green book schedule**	Comprehensive