

# University of Asia Pacific (UAP)

## Department of Computer Science and Engineering (CSE)

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### Course Outline

<b>Program:</b>	Computer Science and Engineering (CSE)
<b>Course Title:</b>	Data Communications
<b>Course Code:</b>	CSE 303
<b>Semester:</b>	Fall -2020
<b>Level:</b>	3-1 ( 5 <sup>th</sup> Semester), Sec – A and B
<b>Credit Hour:</b>	3.0
<b>Name &amp; Designation of Teacher:</b>	Md. Akhtaruzzaman Adnan (Assistant Professor)
<b>Office/Room:</b>	7th Floor, teacher's compound
<b>Class Hours:</b>	Section A: Tue:8.00-9.20am, Thu: 8.00-9.20am Section B: Tue: 3.30-4.50 pm, Thu: 3.30-4.50 pm
<b>Consultation Hours:</b>	TBA
<b>E-mail:</b>	adnan.cse@uap-bd.edu
<b>Mobile:</b>	01711281379
<b>Rationale:</b>	This is a prerequisite course to Computer Network in the CSE program. This knowledge is very important for the field of Communication and Networking professional.
<b>Prerequisite (if any):</b>	ECE 201, PHY 101, MTH 205.

**Course Synopsis:** Introduction to data communication model, Data communication task, Data communication standards and organization, protocol architecture, TCP/IP model and OSI model : data representation, signal encoding and signal analysis; Analog and digital system, Frequency domain and time domain concept of signal, Fourier derivation of a composite signal, Channel: channel capacity, transmission line characteristics, Baseband and Broadband transmission; Guided and unguided transmission media; Transmission networks; Transmission modulation techniques, modems and interfaces; Multiplexing techniques; Introduction to error handling and switching techniques. Introduction to modulation techniques: pulse modulation, pulse amplitude modulation, pulse width modulation and pulse position modulation; pulse code modulation: quantization, delta modulation; TDM, FDM, OOK, FSK, PSK, QPSK; representation of noise, threshold effects in PCM and FM; asynchronous and synchronous communications; Data link control: Line configurations, flow control and error control techniques- sliding window, stop and wait ARQ, selective reject ARQ and HDLC protocol. Course Objectives

**Course Objectives:**

1. Explain the tools and techniques of data communications and networking.
2. Describe briefly network technologies and identify their differences in implementation within and across enterprises.
3. Assess issues of network security and effective management of data communication networks.
4. Explain how information can be sent via communication interfaces and links.
5. Describe the LAN standards and how internetworking works.
6. Explain the use of data communication networks in real-world environments.

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

<b>CO No.</b>	<b>CO Statements:</b> Upon successful completion of the course students should be able to:	<b>Corresponding POs (Appendix-1)</b>	<b>Bloom's taxonomy domain/level (Appendix-2)</b>	<b>Delivery Methods and Activities</b>	<b>Assessment tools</b>
CO1	Provide knowledge on principles of Data Communication and Technology and its applications, protocols	1	1/Remember	Live/recorded video lectures	Class test,
CO2	<b>Identify</b> different Networking Models, switching techniques	1	1/Understand	Live/recorded video lectures	Class test, Assignment
CO3	<b>Explain</b> different factors affecting channel capacity, transmission impairment, transmission media	2,3	1/Understand	Live/recorded video lectures	Class test, Assignment
CO4	<b>Analyze</b> different mechanisms for signal encoding and decoding, multiplexing	2,4,10	1/Analyze	Live/recorded video lectures	Group Presentation
CO5	<b>Implement</b> different flow control and error detection and correction techniques	1,2	1/Apply	Live/recorded video lectures, Problem Solving	Class test, Assignment

**Weighting COs with Assessment methods:**

Assessment Type	% weight	CO1	CO2	CO3	CO4	CO5
Final Exam	50%	5	10	10	10	15
Mid Term	20%	5	5	5	5	
Class performance, Assignments, CTs, Presentation	30%	5	10	5	10	
<b>Total</b>	<b>100%</b>	15	25	20	25	15

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

### **Course Content Outline and mapping with Cos**

DCN= Behrouz A. Forouzan, Data Communications and Networking, McGraw Hill, 4th Edition

Weeks	Topics / Content	Course Outcome	Delivery methods and activities	Reading Materials
1	<b>Introduction:</b> Overview of Data Communication, Data Communication, Network criteria, Physical Structures, Types of Connection, Categories of Network-LAN, MAN, WAN. Internet Protocols and Standards.	CO1	Books, Multimedia, lecture slides	Book DCN Chapter 1
<u>2-3</u>	<b>Network Model:</b> Layered Task, Internet Model: Peer-to-Peer Process, OSI Model, Layers in the OSI model (elaborate discussion on each layer), TCP/IP protocol suite.	CO2	Books, Multimedia, lecture slides	Book DCN Chapter 2
Class test 1				
4	<b>Signals:</b> Concept, Terminology, Analog Signals property, Digital Signal, Composite Signal, Digital Signal, Composite Signal, Analog versus Digital Signal, Data Rate limits, Transmission Impairments: Attenuation, Distortion and Noise, Data rate limits, Performance, Bandwidth, Throughput, Latency, Bandwidth Delay Product, Jitter	CO3	Books, Multimedia, lecture slides, Problem solving	Book DCN Chapter 3
Class test 2				
<u>5-7</u>	<b>Digital Transmission:</b> Concept, Line coding, Unipolar, Polar, NRZ, RZ, Bipolar, Manchester and Differential Manchester coding, Multilevel Schemes, Multiline. Sampling, Pulse Amplitude Modulation, Pulse Code	CO4	Books, Multimedia, lecture slides	Book DCN Chapter 4

	Modulation, and Transmission: Serial, Parallel, Synchronous, And Asynchronous.			
<b>Midterm Examination</b>				
<u>8</u>	<b>Analog Transmission:</b> Amplitude Shift Keying, Frequency Shift Keying. Bandwidth, Phase Shift Keying, Quadrature Amplitude Modulation, Telephone Modems, Modulation of Analog signal, Amplitude Modulation, Frequency Modulation, Phase Modulation.	CO4	Books, Multimedia, lecture slides	Book DCN Chapter 5
9-10	<b>Multiplexing:</b> Concept, Frequency Division Multiplexing, Analog Hierarchy, Wave Division Multiplexing, Time Division Multiplexing, Interleaving, Digital Signal Services, Spread Spectrum: FHSS, DSSS.	CO4	Books, Multimedia, lecture slides	Book DCN Chapter 6
<b>Class test 3</b>				
<u>11</u>	<b>Transmission Media:</b> Guided Media: Twisted Pair, Coaxial Cable, Optical Fiber. Unguided Media: Wireless Transmission.		Books, Multimedia, lecture slides	Book DCN Chapter 7
<u>12</u>	<b>Switching:</b> Circuit Switch Networks, Three phases, Efficiency, Delay, Datagram Networks, Routing Table, Efficiency, Delay, Virtual Circuit Networks, Addressing, Three phases, Efficiency, Delay, Circuit Switch technology in WANs	CO2	Books, Multimedia, lecture slides	Book DCN Chapter 8
<b>Class test 4</b>				
<u>13-14</u>	<b>Error Detection and Correction:</b> Types of Error, Error Detection vs Correction, Modular Arithmetic, Block coding, Hamming Distance, Linear Block Codes, Cyclic codes, Checksum	CO5	Books, Multimedia, lecture slides	Book DCN Chapter 10
<b>Final Examination</b>				

**Required Reference(s):** Behrouz A. Forouzan, Data Communications and Networking, McGraw Hill, 4th Edition.

**Recommended Reference(s):** William Stallings, Data and Computer Communications, Published by Pearson, 8th Edition.

**Special Instructions:**

- Minimum Required Attendance: 70% class attendance is mandatory for a student in order to attend 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 assignment by the last date of submission.

Prepared by	Checked by	Approved by
Md. Akhtaruzzaman Adnan		

**Appendix-1:**

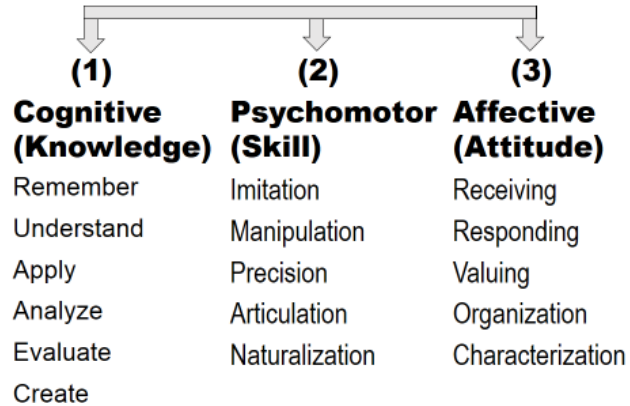
**Washington Accord Program Outcomes (PO) for engineering programs:**

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.

**Appendix-2**

## Bloom's Taxonomy (Taxonomy of Learning)

### 3 Domains



### Appendix-3

#### UAP 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