**University of Asia Pacific (UAP)**

Department of Computer Science and Engineering (CSE)

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**Course Outline**

**Program:**

Computer Science and Engineering (CSE)

**Course Title:**

Data Communications

**Course Code:**

CSE 303

**Semester:**

Spring -2020

**Level:**

3-1 ( 5 th Semester), Sec – A and B

**Credit Hour:**

3.0

**Name & Designation of Teacher:**

Nayeema Sultana , Lecturer

Md. Nahiyan Uddin, Lecturer

**Office/Room:**

7th Floor, teacher’s compound

**Class Hours:** 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

**Consultation Hours:** TBA

**E-mail:**

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**Mobile:**

01723209558

**Rationale:**

This is a pre-requisite course to Computer Network in the CSE program. This knowledge is very important for the field of Communication and Networking professional.

**Pre-requisite**

(if any)**:**

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:**

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:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CO No.** | **CO Statements:**  Upon successful completion of the course students should be able to: | **Corresponding POs**  **(Appendix-1)** | **Bloom’s taxanomy domain/level**  **(Appendix-2)** | **Delivery Methods and Activities** | **Assessment tools** |
| CO1 | **Provide** knowledge on principles of Data Communication and Technology and its applications, protocols | 1 | 1/Remember | Live/recorded video lectures, slides, books | Class test |
| CO2 | **Identify** different Networking Models, switching techniques | 1 | 1/Understand | Live/recorded video lectures | Class test, Assignment |
| CO3 | **Explain** different factors affecting channel capacity, transmission impairment, transmission media | 2,3 | 1/Understand | Live/recorded video lectures | Class test, Assignment |
| CO4 | **Analyze** different mechanisms for signal encoding and decoding, multiplexing | 2,4,9,10 | 1/Analyze | Live/recorded video lectures | Group Presentation |
| CO5 | **Implement** different flow control and error detection and correction techniques | 1,2,3 | 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 |  |
| **Total** | **100%** | 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 | **Introduction:** 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 |
| 2-3 | **Network** **Model:** 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 | **Signals:** 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 | | | | |
| 5-7 | **Digital** **Transmission:** Concept, Line coding, Unipolar, Polar, NRZ, RZ, Bipolar, Manchester and Differential Manchester coding, Multilevel Schemes, Multiline. Sampling, Pulse Amplitude Modulation, Pulse Code Modulation, and Transmission: Serial, Parallel, Synchronous, And Asynchronous. | CO4 | Books, Multimedia, lecture slides | Book DCN  Chapter 4 |
| Midterm Examination | | | | |
| 8 | **Analog Transmission:** Amplitude Shift Keying, Frequency Shift Keying. Bandwidth, PhaseShift 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 | **Multiplexing:** 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 |
| Class test 3 | | | | |
| 11 | **Transmission Media:** Guided Media: Twisted Pair, Coaxial Cable, Optical Fiber. Unguided Media: Wireless Transmission. |  | Books, Multimedia, lecture slides | Book DCN  Chapter 7 |
| 12 | **Switching:** 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 |
| Class test 4 | | | | |
| 13-14 | **Error Detection and Correction:**  **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 |
| Final Examination | | | | |

**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** |

Nayeema Sultana

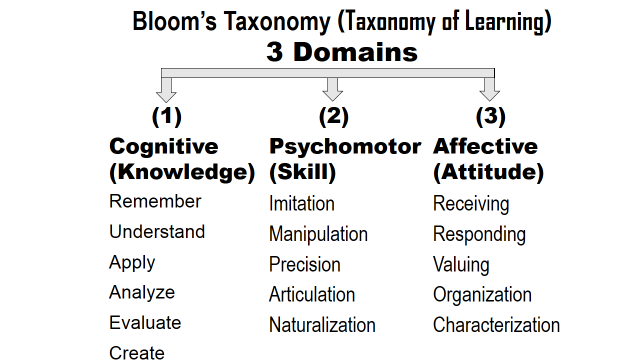
Md. Nahiyan Uddin

**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**



**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 |