

1. **Course General Information:**

| Course Code: | CSE 320 |
| --- | --- |
| Course Title: | Data Communication |
| Credit Hours (Theory): | 3+0 |
| Contact Hours (Theory): | 3 |
| Category: | Core |
| Type: | Lecture |
| Prerequisites: | None |
| Co-requisites: | None |

1. **Course Catalog Description (Content):**

This course will present an introduction to purpose and methods of communication. Necessity for modulation and techniques. Technical aspects of data communications. Effects of noise and control. Basic concepts such as fundamental limits, encoding, modulation, multiplexing, error detection and control. Topics include: Data Transmission Protocols, different layers in data communication systems, LANs, WANs linked with telephony.

1. **Course Objective** 
   1. Introduce Students with fundamental concepts of data communication
   2. Teach students about purpose and methods of communication
   3. Teach necessity for modulation, encoding, multiplexing technique
   4. Explain effects of noise, error detection and control
2. **Course Outcomes (COs):**

Upon successful completion of this course, students will be able to

| **Sl.** | **CO Description** | **Weightage (%)** |
| --- | --- | --- |
| CO 1 | **Describe** the elements of data communication with different network topologies and the functionality of each protocol layer of two network models: OSI and TCP/IP | 20 |
| CO 2 | **Understand** the basics of signal, bit and performance measurements and different signal conversion techniques based on advantages and disadvantages. | 30 |
| CO 3 | **Decide** which bandwidth utilization technique to use in a practical scenario: Multiplexing approaches. | 20 |
| CO 4 | **Analyze** the major components of telephone and cable networks and different transmission mediums based on their physical properties in data transmission. | 10 |
| CO 5 | **Identify** link layer concepts, protocols and services such as error detection and **show** multi-access techniques | 20 |

1. **Mapping of CO-PO-Taxonomy Domain & Level- Delivery-Assessment Tool:**

| **Sl.** | **CO Description** | **PO s** | **Bloom’s taxonomy domain/level** | **Delivery methods**  **and activities** | **Assessment tools** |
| --- | --- | --- | --- | --- | --- |
| CO1 | **Describe** the elements of data communication with different network topologies and the functionality of each protocol layer of two network models: OSI and TCP/IP | a | Cognitive/Analyze | Lectures, notes | Quiz, exam, Assignments |
| CO2 | **Understand** the basics of signal, bit and performance measurements and different signal conversion techniques based on advantage and disadvantages | c | Cognitive/Create | Lectures, notes | Assignments, Quiz, exam |
| CO3 | **Decide** which bandwidth utilization technique to use in a practical scenario: Multiplexing approaches. | d | Cognitive/Analyze | Lectures, notes | Assignments, Quiz, exam |
| CO4 | **Analyze** the major components of telephone and cable networks and different transmission mediums based on their physical properties in data transmission. | d | Cognitive/Analyze | Lectures, notes | Assignments, Quiz, exam |
| CO5 | **Identify** link layer concepts, protocols and services such as error detection and multi-access techniques. | a | Cognitive/Analyze | Lectures, notes | Assignments, Quiz, exam |

1. **Course Materials:**
2. **Text and Reference Books:**

| **Sl**  **.** | **Title** | **Author(s)** | **Publication Year** | **Edition** | **Publisher** | **ISBN** |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | Data Communication and Networking | Behrouz A. Forouzen | 2017 | 5th | McGraw Hill | ISBN 10: [1259064751](https://www.iberlibro.com/products/isbn/9781259064753?cm_sp=bdp-_-ISBN10-_-PLP) |
| 2 | Data and Computer Communications | William Stallings | 2013 | 10th | Pearson | ISBN-10: 0133506487 |

1. **Other materials (if any)**

Lecture Notes and presentation slides

G. **Lesson Plan:**

| No | Topic | Week/Lecture# | Related CO (if any) |
| --- | --- | --- | --- |
| 1 | Introduction to elements of data communication, Network topology, Protocols and standards, Network models: OSI and TCP/IP model, Physical and logical addressing. | **Week 1,2** | CO1 |
| 2 | Basics concepts of signal: Analog and digital signal and their properties, Transmission impairment, Data rate limit calculation | **Week 3** | CO2 |
| 3 | Digital to Digital conversion- Line coding, Block coding and Scrambling techniques | **Week 4** | CO2 |
| 4 | Analog to Digital conversion techniques- PCM, DM. | **Week 5** | CO2 |
| Mid Exam (Week 7) | |  |  |
| 5 | Bandwidth utilization: Multiplexing and spreading, FDM, WDM, Synchronous Time-Division Multiplexing, FHSS and Direct sequence spread spectrum. | **Week 6,8** | CO3 |
| 6 | Major components of telephone network, Dial-Up modems and modem standards, Brief idea of DSL, Cable TV network for data transfer- Downstream and Upstream data band, Downstream and Upstream sharing, Guided and Unguided Medium- Twisted-Pair, Coaxial and fiber optic cable, radio and microwaves, wireless media. | **Week 8** | CO4 |
| 7 | Data link layer concepts, services and multi-access protocols: Channel Partitioning, Random Access and Taking Turns protocols. | **Week 9,10** | CO5 |
| 8 | Different types of error detection and correction mechanisms in the Data Link layer: Block coding, Hamming distance, CRC, Checksum. | **Week 11,12** | CO5 |
| Final Exam | |  |  |

1. **Assessment Tools:**

| **Assessment Tools** | **Weightage (%)** |
| --- | --- |
| 1. Participation in class | 5 % |
| 2. Quizzes/Class Tests | 15% |
| 3. Mid Term Examination | 25 % |
| 4. Assignments | 15 % |
| 5. Final | 40 % |

1. **CO Assessment Plan:**

| **Assessment Tools** |  |  |  |  | |
| --- | --- | --- | --- | --- | --- |
| **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| Quizzes | x | x | x |  | x |
| Assignments | x | x | x | x | x |
| Examinations | x | x | x | x | x |

1. **CO Attainment Policy:**

As per Department of CSE course outcome attainment policy

1. **Grading policy:**

As per Brac grading policy

1. **Course Coordinator:**

**Mehnaz Seraj (SRJ)**