**Course Description and Outcome Form**
Department of Computer Science and Engineering
School of Engineering and Computer Science
Brac University

## A. 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 |

## B. Course Catalog Description (Content):

This course will present an introduction to purpose and methods of communication. First of all, the course will cover the principles of networking by using the protocol layering of the Internet and the TCP/IP protocol suite. Starting from the Physical layer, this course will cover the concepts of analog and digital data and signals , their performance measurements, effects of noise and control. Next, some basic concepts such as data rate limits, analog to digital conversion methods, modulation and bandwidth utilization techniques are discussed in this course. Lastly, Data Link layer concepts and services such as error detection and multiple-access protocols are explained.

## C. Course Objective

1) Introduce Students with fundamental concepts of data communication
2) Explain the principles of networking by using the protocol layering of the Internet
3) Teach necessity for modulation, analog to digital conversion methods and different multiplexing techniques
4) Explain effects of noise, error detection and control etc.

## D. Course Outcomes (COs):

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

| Sl. | CO Description | Weightage (%) |
|---|---|---|
| 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 | 20 |
| CO2 | **Understand** the basics of signal, bit and performance measurements and learn different conversion techniques (from analog to digital and digital to digital) based on their advantages and disadvantages. | 30 |
| CO3 | **Explain** different ways of bandwidth utilization: Multiplexing and Spreading approaches | 25 |
| CO4 | **Discuss** Data-link layer concepts, services and various multiple-access protocols | 25 |

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

| Sl. | CO Description | POs | 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/Understand | Lectures, notes | Mid and Final Exam |
| CO2 | **Understand** the basics of signal, bit and performance measurements and learn different conversion techniques (from analog to digital) based on their advantages and disadvantages. | a | Cognitive/Understand | Lectures, notes | Mid and Final Exam |
| CO3 | **Explain** different ways of bandwidth utilization: Multiplexing and Spreading approaches | b | Cognitive/Analyze | Lectures, notes | Mid and Final Exam |
| CO4 | **Discuss** Data-link layer concepts, services and various multiple-access protocols | b | Cognitive/Analyze | Lectures, notes | Mid and Final Exam |

**F. Course Materials:**

**i. 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 |
| 2 | Data and Computer Communications | William Stallings | 2013 | 10th | Pearson | ISBN-10: 0133506487 |

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

Lecture Notes and presentation slides

**G. Lesson Plan:**

| No | Topic | Week | Related CO (if any) |
|---|---|---|---|
| 1 | Introduction to elements of data communication, Network topology, Protocols and standards, | **Week 1** | CO1 |
| 2 | Network models: OSI and TCP/IP model | **Week 2** | CO1 |

| 3 | Basics concepts of signal: Analog and digital signal and their properties, Transmission impairment, Data rate limit calculation | **Week 3** | CO2 |
|---|---|---|---|
| 4 | Digital to Digital conversion- Line coding, Block coding and Scrambling techniques | **Week 4** | CO2 |
| 5 | Analog to Digital conversion techniques- PCM, DM. | **Week 5** | CO2 |
| Mid Exam (Week 6) | | | |
| 6 | Digital to Analog conversion techniques- ASK, FSK, PSK | **Week 7** | CO2 |
| 7 | Bandwidth utilization: Multiplexing and spreading, FDM, WDM, Synchronous Time-Division Multiplexing | **Week 8** | CO3 |
| 8 | Bandwidth utilization: Multiplexing and spreading, FHSS and Direct sequence spread spectrum. | **Week 9** | CO3 |
| 9 | Data link layer concepts, services and multiple-access protocols: Channel Partitioning, Random Access and Taking Turns protocols. | **Week 10** | CO4 |
| 10 | Different types of error detection and correction mechanisms in the Data Link layer: Hamming distance, Block coding, CRC, Checksum. | **Week 11** | CO4 |
| Final Exam ( Week 12) | | | |

## H. 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% |

## I. CO Assessment Plan:

| Assessment Tools | | | | |
|---|---|---|---|---|
| | **CO1** | **CO2** | **CO3** | **CO4** |

| | | | | |
|---|---|---|---|---|
| Quizzes | x | x | x | x |
| Assignments | x | x | x | x |
| Examinations | x | x | x | x |

**J. CO Attainment Policy:**

As per Department of CSE course outcome attainment policy

**K. Grading policy:**

As per Brac grading policy

**L. Course Coordinator:**

**Mehnaz Seraj (SRJ)**

**Md. Ahasanul Alam (AHU)**