Course Outline

**Course: SWE 321: Data Communication with Lab (Theory)**

**Teaching Staff:**

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| --- | --- |
| **Category** | **Description** |
| Corse Teacher with Section and Semester | Afsana Begum, Section: A,B. Semester: 8 |
| Course Code | SWE 321 |
| Title | Data Communication with Lab ( Theory ) |
| Credit | 3 |
| Total Cr. Hour | 40 |
| Class room |  |
| Class time |  |
| Office Hour |  |
| Consultancy Hour |  |
| Email | afsana.swe@diu.edu.bd |
| Google Classroom Code | Sec-A = trphdr Sec-B= wvgpwcd |

**Course Objectives (CO’s):**

1. The students will learn the differences of total data communication architecture and why each part is need. How data is transferred from one computer to another.
2. The students will learn two or more devices are connected and how we construct a network.
3. The students will learn OSI Layer and how the communication takes place.
4. The students will learn how data transmission takes place and how to convert one type to another, so that they can understand how a digital and analog device works.

**Prerequisite:** Digital Electronics

**Learning Outcomes (LO’s):**

|  |  |
| --- | --- |
| No. | Outcomes (LO’s) |
| **Knowledge** | |
| 1 | Understand communication architecture, protocol, data representation and data flow. |
| 2 | Understand how our device works when we use our device to communicate with each other. |
| 3 | Understand signal conversion and layers for standard communication. |
| **Skill** | |
| 4 | To be able to understand how we are connected with internet. |
| 5 | To be able to understand how our message go from my device to my desired destination through the internet. |
| 6 | To be able to understand how our device converts our data into signal and vice versa. |
| 7 | To be able to do sub-netting. |
| **Self Development** | |
| 8 | To be able to take decision that which topology is best for a specific network. |
| 9 | To be able to decide which data flow we should use to communicate in a specific case. |
| **Role in Context** | |
| 10 | To be able to decide which data flow and topology is best for a specific context. |
| **Attitude** | |
| 11 | To be able to understand how our internet connection, dish connection, mobile communication or wireless communication are takes place. |

**Course Description:**

Data Communication course will help student to understand how data goes from one device to another device. Its helps to understand how our data became information and goes through a transmission media as a signal. This course contains how our devices are detected by IP address and how we use one IP address to many more users. This course helps to know how our signal is affected by noise and how to minimize it. Overall this course helps to know total communication architecture between two or more devices.

**Course Methodology:**

1. Class size of 30-35 Students
2. Classroom with a projector, a computer and a white marker board
3. Industrial visit may be required for the course at the end of the semester
4. Students may need to attend workshop during the turner of the course

**Assessment:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| No. | Assessment Methods | Weighing | | | Remarks |
| 1 | Continuous Assessment | 35% | 7% | Attendance | To measure how well students have learned throughout the semester. |
| 15% | Quiz (Min 4 Quizzes) |
| 8% | Presentation |
| 5% | Assignment |
|  | | | | | |
| 2 | Examinations | 65% | 25% | MID term exam | To measure how far students have achieved the learning outcomes. |
| 40% | Final Exam |

**Mapping of Assessment with Learning Outcomes (LO’s):**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| No. | Learning Outcome | Course Assessment Methods | | | | | |
| (LO’S) | | Attendance | Quiz | Presentation | Assignment | MID | FINAL |
| 1 | Understand communication architecture, protocol, data representation and data flow. | x | x | x |  | x |  |
| 2 | Understand how our device works when we use our device to communicate with each other. | x | x | x |  | x |  |
| 3 | Understand signal conversion and layers for standard communication. | x | x | x | x | x |  |
| 4 | To be able to understand how we are connected with internet. | x | x | x |  | x | x |
| 5 | To be able to understand how our message go from my device to my desired destination through the internet. | x | x | x | x | x | x |
| 6 | To be able to understand how our device converts our data into signal and vice versa. | x | x | x |  | x | x |
| 7 | To be able to do sub-netting. | x | x | x | x | x |  |
| 8 | To be able to take decision that which topology is best for a specific network. |  |  |  |  |  |  |
| 9 | To be able to decide which data flow we should use to communicate in a specific case. | x | x | x | x | x |  |
| 10 | To be able to decide which data flow and topology is best for a specific context. | x | x | x |  | x |  |
| 11 | To be able to understand how our internet connection, dish connection, mobile communication or wireless communication are takes place. | x | x | x |  | x | x |

**Rubrics:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Weighing | Letter Grade | Category | Description |
| 1 | 80% | A+ | Outstanding | Very Strong evidence of having achieved all the LO’s and demonstration of exceptional mastery of data communication knowledge and skills.  Able to develop correct topology to specific cases. |
| 2 | 75% | A | Excellent | Strong evidence of having achieved all the LO’s and demonstration of mastery of data communication knowledge and skills.  Able to develop correct topology to specific cases. |
| 3 | 70% | A- | Very Good | Evidence of having achieved 90% of the LO’s with good understanding of data communication knowledge and skills.  Able to develop correct topology to specific cases. |
| 4 | 65% | B+ | Good | Evidence of having achieved 80% of the LO’s with understanding of data communication knowledge and skills.  Able to develop correct topology to specific cases. |
| 5 | 60% | B | Satisfactory | Evidence of having achieved 70% of the LO’s with basic understanding of data communication knowledge and skills.  Able to develop correct topology to specific cases. |
| 6 | 55% | B- | Above Average | Evidence of having achieved 60% of the LO’s with minimal understanding of data communication knowledge and skills.  Able to develop correct topology to specific cases. |
| 7 | 50% | C+ | Average | Evidence of having achieved 50% of the LO’s with minimal understanding of data communication knowledge and skills.  Able to develop correct topology to specific cases. |
| 8 | 45% | C | Below Average | Evidence of having achieved 40% of the LO’s with minimal understanding of data communication knowledge and skills.  Able to develop correct topology to specific cases. |
| 9 | 40% | D | Pass | Evidence of having achieved 30% of the LO’s with little understanding of data communication knowledge and skills.  Able to develop correct topology to specific cases. |
| 10 | <40 | F | Fail | Evidence of having achieved below 30% of the LO’s with very little understanding of data communication knowledge and skills.  Able to develop correct topology to specific cases. |

**Teaching Method (TM):**

|  |  |  |  |
| --- | --- | --- | --- |
| No. | **Method Name** | **Description** | **Medium Used** |
|  | **Authority, or lecture style** | This traditional, formal approach to teaching is sometimes referred to as “the sage on the stage.” | **white board, marker** |
|  | **Demonstrator, or coach style** | This style retains the formal authority role while allowing teachers to demonstrate their expertise by showing students what they need to learn | **use projector, PC, presenter** |
|  | **Facilitator, or activity style** | This approach encourages teachers to function as advisors who help students learn by doing. | **Use VIP card, Marker, provide sheet** |
|  | **Developer, or group style** | This style allows teachers to guide students in a group setting to accomplish tasks and learn what works or doesn’t. | **use card and poster and presentation in a group** |
|  | **Hybrid, or blended style** | This approach incorporates different aspects of the various styles and gives teachers flexibility to tailor a personal style that’s right for their coursework and students | **use multiple approaches together** |
|  | **Virtual Learning** | Use Google classroom or Learning feedback system to provide distant learning to students. | **Use internet, computer network, web site** |

**Mapping of Lesson plan to the Learning Outcomes and Teaching Methods:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| No. | Session | Topic/ Content | Teaching Method  (TM) | Learning Outcomes (LO’s) |
| 1 | Session 1 | Course Objective  **Class 1:** Discuss course objectives, grading policies, etc. Concepts of networking and data communication | 4 | 1 |
| 2 | Session 2 | Data Communication Principle  **Class 1:** What is Data Communication, Requirements of Data Communication, Effectiveness of Data Communication, Transmission Medium, Data Representation  **Class 2:** Protocols, Data Flow, Communication Architecture/ Basic elements of Data Communication | 1, 2 | 1, 2 |
| 3 | Session 3 | Topology  **Class 1:** Mesh, Ring topology details  **Class 2:** Star, tree topology details  **Class 3:** Bus and Hybrid topology details | 1, 2,5 | 4,5,8,10,11 |
| 4 | Session 4 | OSI Model  **Class 1:** OSI Model introduction, Application and Presentation layer detail  **Class 2:** Session and Transport layer detail  **Class 3:** Network and Data link layer detail  **Class 4:** Physical layer detail and total OSI Model Analogy  **Class 5:** Data Flow through a network | 1, 2,6 | 1,2,3,8,11 |
| 5 | Session 5 | IP Address  **Class 1:** Basics of IP Address  **Class 2:** Sub-netting | 1, 2,3 | 7 |
| 6 | Session 6 | Data Transmission  **Class 1:** Analog and digital data, analog and digital signal, amplitude, frequency, phase, period  **Class 2:** Phase shifting, time frequency domain, Bandwidth, Bit Rate, Transmission of digital signal, baseband and broadband.  **Class 3:** Transmission impairments- Attenuation, distortion and noise. Noise Classification, Signal to noise ratio  **Class 4:** Channel capacity, Shannon capacity, Performance measurement, Delay, propagation time, Transmission time and queuing time. | 1, 2,4 | 5,6 |
| 7 | Session 7 | Digital Transmission  **Class 1:** Digital to digital conversion Line coding, block coding and Scrambling, Signal Element Versus Data Element  **Class 2:** Data Rate Versus Signal Rate, uni-polar scheme- NRZ,  **Class 3:**Polar scheme- NRZ-L, NRZ-I, RZ, Bi-Phase  **Class 4:** Manchester and Differential Manchester coding , Bi-polar- AMI | 1, 2,5 | 1,2,9 |
| 8 | Session 8 | ANALOG-TO-DIGITAL CONVERSION  **Class 1:** PCM-Sampling, Sampling and Nyquist Theorem, Quantization.  **Class 2:** Encoding, Transmission modes  **Class 3:** Serial and parallel Transmission, Asynchronous and synchronous Transmission | 1, 2,5 | 2,9 |
| 9 | Session 9 | **D**igital-to-Analog Conversion  **Class 1:** **D**igital-to-Analog Transmission details, also related mathematics  **Class 2:** Carrier Signal, ASK details  **Class 3:** FSK details, PSK details | 1, 2,4 | 2,9 |

**Reference:**

1. Data Communication and Networking By Forouzan
2. Data Communications and Networks By-Godbole
3. Wireless Communications: Principles and practice – Theodore S. Rappaport
4. Internet

**Disclaimer:**

While every effort has been made to ensure that the information contained in this document is accurate, the information is subject to change. Changes will be notified in class and/or tutorials, via Google Classroom or email. Students are encouraged to check Google Classroom or email for any changes. It is your responsibility to be informed.