Ahsanullah University of Science and Technology
Bangladesh

COURSE OUTLINE

Part A

1. Course No./Course Code: ***CSE 2211 (BNQF 061)***

2. Course Title: ***Data Communication***

3. Course Type (GEd/Core Course/Elective): ***Core Course***

4. Year/Level/Semester/Term: ***Year-2, Semester-2***

5. Academic Session: ***Fall 2022***

6. Course Teacher/Instructor: Tahsin Aziz

7. Pre-requisite(s) (if any): ***N/A***

8. Credit Value: ***3***

9. Credit Hours: ***3***

10. Total Marks: ***100***

11. Rationale of the Course: ***SDG 4 (Ensure Technical Level Education) and SDG 8 (Reduce Unemployment Rate).***

12. Faculty: Engineering

13. Department: Computer Science and Engineering (CSE)

14. Programme: Bachelor of Science in Computer Science and Engineering (B.Sc. in CSE)

15: Course Objectives:

Data: data representation, signal encoding and signal analysis; Data Transmission 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.

16. Mapping of Course Outcomes with Bloom's Taxonomy and Programme Outcomes
After the successful completion of this course, students will be able to:

Sl. No.	COs	POs	Bloom's Taxonomy		
			C	A	P
1	Explain the basic concepts of Data Communication and signal processing	1	2		
2	Apply different conversion techniques to convert digital to digital signal, digital to analog signal	2	3		
3	Analyze the transmitted signal to detect error	4	4		

17. Mapping of COs with Knowledge Profiles, Complex Engineering Problem Solving and Complex Engineering Activities

Course Outcome	Knowledge Profile	Complex Problem Solving	Complex Engineering Activities
CO1	K4		
CO2	K4		
CO3	K8		

Part B

18. Week-wise Course Plan

Week	Topics	Teaching-Learning Strategy	Assessment Strategy	Corresponding COs
1	Overview of the course; Data, Networks Layered Architecture: OSI Model, Layers of the OSI Model, TCP/ IP Model	- Lecture - Think – Pair -Share (TPS)	- *Class Performance*	1, 2
2	Data and signal; Analog and Digital Data and signal; Familiarizing terms: Sine wave, phase,	- Lecture - Think – Pair -Share (TPS)	- *Class Performance*	1, 2, 3

	wavelength, time frequency domains, composite signals, bandwidth, bit rate, bit length, digital signal as a composite analog signal, transmission of digital signals			
3	Transmission Impairment, Channel Capacity and performance; Attenuation, Distortion and Noise Bit rate Limits; Nyquist Theorem, Shannon Capacity Bandwidth, Throughput, Latency	- Lecture - Brainstorming Session - Think – Pair -Share (TPS)	- *Class Performance*	1, 2, 3
4	Digital to Analog Conversion; Line Coding and Line Coding Schemes: Unipolar (NRZ), Polar (NRZ, RZ, Biphase), Bipolar (AMI, Pseudoternary)	- Lecture - Brainstorming Session - Think – Pair -Share (TPS)	- *Class Performance* - Quiz 1	1, 2, 3
5	Multilevel (2B1Q, 8B6T, 4D-PAM5), Multitransition (MLT-3) Block Coding; (4B/5B, 8B/10B) Scrambling; (B8ZS, HDB3)	- Lecture - Brainstorming Session - Think – Pair -Share (TPS)	- *Class Performance*	1, 2, 3
6	Analog to Digital Conversion and Transmission Modes; Pulse Code Modulation, Delta Modulation Parallel and Serial Transmission	- Lecture - Brainstorming Session	- *Class Performance* - Quiz 2	1, 2, 3
7	Digital to Analog Conversion; Amplitude Shift Keying, Frequency Shift Keying, Phase Shift	- Lecture - Brainstorming Session	- *Class Performance*	2, 3

	Keying, Quadrature Shift Keying			
	Mid Break			
8	Analog to Analog Conversion; Amplitude Modulation, Frequency Modulation, Phase Modulation	- Lecture - Think – Pair -Share (TPS)	*- Class Performance*	2, 3
9	Multiplexing; Frequency Division Multiplexing, Wavelength Division Multiplexing, Synchronous Time Division Multiplexing, Statistical Time Division Multiplexing	- Lecture - Brainstorming Session	*- Class Performance*	1, 2, 3
10	Spread Spectrum and Transmission Media; Frequency Hopping Spread Spectrum, Direct Sequence Spread Spectrum, Guided and Unguided Transmission Media	- Lecture - Brainstorming Session - Think – Pair -Share (TPS)	*- Class Performance* - Quiz 3	1, 2, 3
11	Switching; Circuit Switched and Packet Switched Network	- Lecture - Think – Pair -Share (TPS)	*- Class Performance*	1, 2, 3
12	Error Detection vs Correction; Different types of Errors, Hamming Distance, Cyclic Codes, Checksum, Forward error Correction	- Lecture - Brainstorming Session - Think – Pair -Share (TPS)	*- Class Performance*	1, 2, 3
13	Data Link Control; Data Link Layer Protocols, HDLC, PPP	- Lecture - Brainstorming Session - Think – Pair -Share (TPS)	*- Class Performance* *- Quiz 4*	1, 2, 3
14	Revision	- Brainstorming Session - Think – Pair -Share (TPS)	*- Class Performance*	2, 3

Part C

19. Assessment and Evaluation

1) Assessment Strategy: ***Class Performance, Quizzes/Assignments, and Final Examination***

2) Marks distribution:

a) Continuous Assessment: ***Class Performance (10), Quizzes/Assignments (20)***

b) Summative: ***Final Examination (70)***

3) Make-up Procedures: ***Carryover/Clearance/Improvement Examination***

Part D

20. Learning Materials

20.1. Required (if any)

1. ***"Data Communications and Networking" by Behrouz A. Forouzan. Publisher: McGraw-Hill, 5th Ed., 2012.***
2. ***Course Website – https://classroom.google.com***
   Spring 2022 - Data Communications - CSE 2211
   Class Code:

20.2. Recommended (if any)

20.1. Others (if any)

Prepared by:	**Checked by:**	**Approved by:**
Signature: _____	Signature: _____	Signature: _____
Name: Tahsin Aziz **Department: CSE** **Date:**	**Name: Md. Aminur Rahman** **OBE Program Coordinator, CSE** **Date:**	**Name: Dr. Mohammad Shafiul Alam** **HOD, CSE** **Date:**

Annex-1: PEO of CSE

PEO1 - Professionalism
Graduates will demonstrate sound professionalism in computer science and engineering or related fields.

PEO2 – Continuous Personal Development
Graduates will engage in life-long learning in multi-disciplinary fields for industrial and academic careers.

PEO3 – Sustainable Development
Graduates will promote sustainable development at local and international levels.

Annex-2: Mapping of PEO-PO

	PEO1	PEO2	PEO3
PO1 - Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.	√		
PO2 - Problem analysis: Identify, formulate, research and analyze complex engineering problems and reach substantiated conclusions using the principles of mathematics, the natural sciences and the engineering sciences.	√		
PO3 - Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.	√		
PO4 – Investigation: Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.	√		
PO5 - Modern tool usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	√		
PO6 - The engineer and society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.	√		√

PO7 - Environment and sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.	√		√
PO8 – Ethics: Apply ethical principles and commit to professional ethics, responsibilities and the norms of engineering practice.	√		
PO9 - Individual work and teamwork: Function effectively as an individual and as a member or leader of diverse teams as well as in multidisciplinary settings.	√	√	
PO10 – Communication: Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.	√		
PO11 - Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member or a leader of a team to manage projects in multidisciplinary environments.	√		
PO12 - Life-long learning: Recognize the need for and have the preparation and ability to engage in independent, life-long learning in the broadest context of technological change.		√	

Annex-3: Bloom's Taxonomy *

Level	Cognitive Domain – Revised Version	Affective Domain	Psychomotor Domain
1	Remember (1)	Receiving Phenomena (1)	Perception (1)
2	Comprehend (2)	Responding to Phenomena (2)	Set (2)
3	Apply (3)	Valuing (3)	Guided Response (3)
4	Analyse (4)	Organizing Values (4)	Mechanism (4)
5	Evaluate (5)	Internalising Values (5)	Complex Overt Response (5)
6	Create (6)		Adaption (6)
			Origination (7)

* Based on "REVISED BLOOM'S TAXONOMY INDICATOR v3.31" , available athttp://adept.mmu.edu.my/wp-content/uploads/2018/09/Blooms-Taxonomy-Indicator-v3.31.xls