



Ahsanullah University of Science and Technology Bangladesh

COURSE OUTLINE

1. Title: **Data Communication**
2. Code: **CSE 3211**
3. Credit hours: **3**
4. Level: **Level 3, Term 2**
5. Faculty: **Engineering**
6. Department: **Computer Science and Engineering (CSE)**
7. Program: **Bachelor of Science in Computer Science and Engineering (B.Sc. in CSE)**
8. Course Synopsis:
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.
9. Type of course (core/elective): **Core**
10. Prerequisite(s) (if any): **MATH 2203**
11. Name of the instructor(s) with contact details and office hours:

H M Zabir Haque

Room:

Phone: +88 01911 289 247

E-mail: zabir.haque.cse@aust.edu

Office hour: SUN 10:30 AM – 01:00 PM, THU 09:40 AM – 10:30 AM

12. Semester Offered: **Spring 2021**
13. Mapping of Course Outcomes with Bloom's Taxonomy and Program Outcomes

After successful completion of the course, the students will be expected to:

Sl. No.	COs	POs	Bloom's Taxonomy		
			C	A	P
1	Comprehend 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		

14. 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		

15. Percentages of Assessment Methods

Method	Percentage
Class Performance	10
Quizzes	20
Final Examination	70

16. Week wise distribution of contents and assessment methods

Week	Topics	Assessment Method(s)
1	<ul style="list-style-type: none"> Overview of the course Layered Architecture: OSI Model, Layers of the OSI Model 	
2	<ul style="list-style-type: none"> Data: Analog and Digital Data Familiarizing terms: Sine wave, phase, wavelength, time frequency domain domains, composite signals, bandwidth, bit rate, bit length, digital signal as a composite analog signal, transmission of digital signals 	
3	<ul style="list-style-type: none"> Transmission Impairment and Channel Capacity: Attenuation, Distortion and Noise Bit rate Limits: Nyquist Theorem, Shannon Capacity 	
4	<ul style="list-style-type: none"> Line Coding and Line Coding Schemes Unipolar (NRZ) Polar (NRZ, RZ, Biphase) 	Quiz 1

	<ul style="list-style-type: none"> • Bipolar (AMI, Pseudoternary) 	
5	<ul style="list-style-type: none"> • Multilevel (2B1Q, 8B6T, 4D-PAM5) • Multitransition (MLT-3) • Block Coding (4B/5B, 8B/10B) • Scrambling (B8ZS, HDB3) 	
6	<ul style="list-style-type: none"> • Analog to Digital Conversion • Pulse Code Modulation • Delta Modulation 	Quiz 2
7	<ul style="list-style-type: none"> • Aspects of Digital to Analog Conversion • Amplitude Shift Keying • Frequency Shift Keying • Phase Shift Keying • Quadrature Shift Keying 	
8	<ul style="list-style-type: none"> • Analog to Analog Conversion • Amplitude Modulation • Frequency Modulation • Phase Modulation 	
9	<ul style="list-style-type: none"> • Multiplexing • Frequency Division Multiplexing • Wavelength Division Multiplexing 	
10	<ul style="list-style-type: none"> • Synchronous Time Division Multiplexing • Statistical Time Division Multiplexing 	
11	<ul style="list-style-type: none"> • Spread Spectrum • Frequency Hopping Spread Spectrum • Direct Sequence Spread Spectrum 	Quiz 3
12	<ul style="list-style-type: none"> • Guided Transmission Media • Unguided Transmission Media 	
13	<ul style="list-style-type: none"> • Error Detection vs Correction • Different types of Errors • Hamming Distance 	
14	<ul style="list-style-type: none"> • CRC, Checksum • Revision 	Quiz 4

17. References

17.1. Required

1. **“Data Communications and Networking” by Behrouz A. Forouzan. Publisher: McGraw-Hill, 5th Ed., 2012.**
2. **Course Website – <https://classroom.google.com>
CSE 3211 – Data Communication (Spring 2021)
Class Code: vljffe3**

17.2. Recommended

Prepared by:	Checked by:	Approved by:
Signature: _____	Signature: _____	Signature: _____
Name: H M Zabir Haque Department: CSE Date: 30.11.2021	Name: H M Zabir Haque 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: Blooms 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 at <http://adept.mmu.edu.my/wp-content/uploads/2018/09/Blooms-Taxonomy-Indicator-v3.31.xls>

Annex-4: Knowledge Profile

BAETE MANUAL 2019, 2 nd ed. (TABLE 4.1) - KNOWLEDGE PROFILE		
K1	Natural sciences	A systematic, theory-based understanding of the natural sciences applicable to the discipline.
K2	Mathematics	Conceptually-based mathematics, numerical analysis, statistics and formal aspects of computer and information science to support analysis and modelling applicable to the discipline.
K3	Engineering fundamentals	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.
K4	Specialist Knowledge	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
K5	Engineering Design	Knowledge that supports engineering design in a practice area.
K6	Engineering Practice	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.
K7	Comprehension	Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the professional responsibility of an engineer to public safety; the impacts of engineering activity: economic, social, cultural, environmental and sustainability.
K8	Research literature	Engagement with selected knowledge in the research literature of the discipline.