



COURSE OUTLINE

Course Code : CSE311

Course Title: Data Communication I

Level/Term : 3-1

Section: A and B

Academic Session : February 2017

Course Teacher(s):

Name:	Office/Room:	E-mail and Telephone: (optional)
Khaled Mahmud Shahriar (KMS)	217	khaledshahriar@cse.buet.ac.bd kmsahriar@gmail.com (preferred)
Mohammad Ali Nayeem (MAN)	216	ali_nayeem@cse.buet.ac.bd

Course Outline : (from departmental course calendar, available online: [http://cse.buet.ac.bd/undergrad/course-calendar/CSE BUET UG Course Calendar 2011.pdf](http://cse.buet.ac.bd/undergrad/course-calendar/CSE%20BUET%20UG%20Course%20Calendar%202011.pdf))

Signal and random processes; Review of Fourier Transform; Hilbert Transform, continuous wave modulation: AM, PM, FM; Sampling theorem; Pulse modulation: PAM, PDM, PPM, PCM, companding, delta modulation, differential PCM; Multiple access techniques: TDM, FDM; Digital modulation: ASK, PSK, BPSK, QPSK, FSK, MSK, constellation, bit error rate (BER); Noise; Echo cancellation; Intersymbol Interference; Concept of channel coding and capacity.

Learning Outcomes/Objectives:

After undergoing this course, students should be able to:

- Understand the fundamental concepts and components of modern digital and analog communication systems.
- Understand mathematical foundations of communication engineering and learn to apply mathematical tools such as linear algebra, Fourier analysis, probability theory to study, model, analyze, compare and optimize the physical layer of a communication system.
- Understand issues related to sampling, quantization and encoding which are basic blocks of an analog to digital conversion process.
- Comprehend issues related to analog and digital signal transmission: difference between baseband and passband transmission, different modulation techniques for efficient channel utilization, sources and effects of noise and ways to eliminate noise for error free signal transmission.



Assessment

Class Tests/Assignments/ Projects:	20%
Attendance:	10 %
Term final :	70%

Text and Reference books:

- Modern Digital and Analog Communication Systems, 4th edition, B P Lathi Zhi Ding
- Data communications and networking, 4th edition, Behrouz A Forouzan ([PDF](#))
- Information, transmission, modulation and noise, 4th edition, Mischa Schwartz

Online Courseware:

Moodle page: <http://cse.buet.ac.bd/moodle/course/view.php?id=253>

Weekly schedule :

Week	Topics	Teacher's Initial
Week 1	<ul style="list-style-type: none"> Introduction to the course: administrative details, motivation and course content Scope of the course and the broader perspective Introduction to signals 	KMS
Week 2	<ul style="list-style-type: none"> Recapitulation on Fourier transformation and its application in analysis of systems and signals Introduction to systems and response of systems to signals 	KMS
Week 3	<ul style="list-style-type: none"> Introduction to digital communication system Analog to digital conversion process: Sampling, quantization and encoding Sampling theorem and practical issues related to sampling 	KMS
Week 4	<ul style="list-style-type: none"> Quantization and Encoding 	KMS
Week 5	<ul style="list-style-type: none"> Pulse Code Modulation (PCM) systems and their variants 	KMS
Week 6	<ul style="list-style-type: none"> Issues related to digital data transmission Digital baseband modulation Digital signal multiplexing: TDM (Time division multiplexing) 	KMS
Week 7	<ul style="list-style-type: none"> Cause and effect of Intersymbol interference (ISI) in digital transmission systems and ways to eliminate ISI Introduction to noise; modeling and analysis of noise on signals and systems. Recapitulation on content so far covered. 	KMS



Week	Topics	Teacher's Initial
Week 8	<ul style="list-style-type: none"> Basics of Modulation Techniques, Analog signal modulation techniques: Amplitude Modulation (AM): <ul style="list-style-type: none"> Basic of Double Side Band(BSC), AM with suppressed carrier (DSB-SC)) AM with carrier (DSB-WC) 	MAN
Week 9	<ul style="list-style-type: none"> Amplitude Modulation (AM): <ul style="list-style-type: none"> Quadratic Amplitude Modulation(QAM) AM: Single Side Band (SSB) Vestigial Side band (VSB) Carrier Acquisition: (Phase Locked Loop) 	MAN
Week 10	<ul style="list-style-type: none"> FDM Angle Modulation Techniques <ul style="list-style-type: none"> Frequency Modulation(FM) Phase Modulation(PM) Bandwidth analysis of FM, PM. 	MAN
Week 11	<ul style="list-style-type: none"> Demodulation Techniques of FM/PM Common Channel coding techniques for digital data transmission 	MAN
Week 12	<ul style="list-style-type: none"> Digital Carrier Systems Digital Modulation Techniques <ul style="list-style-type: none"> On-off keying (OOK)/ Amplitude shift keying (ASK) Phase Shift Keying (PSK) Frequency Shift Keying (FSK) Differentially coherent PSK (DPSK) 	MAN
Week 13	<ul style="list-style-type: none"> Digital Modulation Techniques <ul style="list-style-type: none"> Quadrature PSK (QPSK) M-ary QAM Minimum Shift Keying (MSK) Continuous Phase Frequency Shift Keying(CPFASK) 	MAN
Week 14	<ul style="list-style-type: none"> Summary & Overview Class 	KMS+MAN

Prepared by :	
Name: Khaled Mahmud Shahriar	Mohammad Ali Nayeem
Signature:	Signature:
Date:	Date: