Name of Institute: institute of technology and engineering
Subject coordinator: Prof. Ashwin Patani
Name of Faculties: Prof. Ashwin Patani
Course code: EC0316
Course name: Data Communication and networking
Pre-requisites: Basics of Computer hardware and software
Credit points: 4
Offered Semester: 3rd
Course coordinator and lecturer (weeks 01 - 12)
Full name: Ashwin Patani
Department with sitting location: 2nd floor EE lab-1
Telephone:
Email: ashwinpatani.ec@indusuni.ac.in
Consultation times: Monday to Friday, 4 PM to 5 PM
Students will be contacted throughout the session via mail with important information relating to this course.
Course Objectives
By participating in and understanding all facets of this course a student will:
1) To understand the building blocks of digital communication system.
2) To prepare mathematical background for communication signal analysis.
3) To understand and analyze the signal flow in a digital communication system.
4) To analyze error performance of a digital communication system in presence of noise and other interferences.
5) To understand concept of spread spectrum communication system

Course Outcomes (CO)
After successful completion of the course students should be able to:
• To Focus on information sharing and networks
• To Introduce flow of data, categories of network, different topologies
• To Focus on different coding schemes
• To give clear idea of signals, transmission media, errors in data communications and their correction, networks classes and devices,etc.

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Course Outline
Data communication

Study of Signals
Digital transmission
Analog transmission
Digital data transmission over analog signal
Analog data transmission over digital signal
Pulse Modulation
Digital data transmission
Information Theory and Coding

Method of delivery

Face to face lectures, self study material, Active Learning Techniques, seminars, group discussion

Study time

(9 hours per week including class attendance)

CO-PO Mapping (PO: Program Outcomes)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	-	-	-	-	-	-	-	-	1
CO2	2	2	1	1	3	-	-	-	-	-	-	-
CO3	1	2	2	2	3	-	-	-	-	-	-	-
CO4	1	2	1	-	-	-	-	-	-	-	-	1

Where
1. Low

2. Medium

3. High

Blooms Taxonomy and Knowledge retention (For reference)

(Blooms taxonomy has been given for reference)

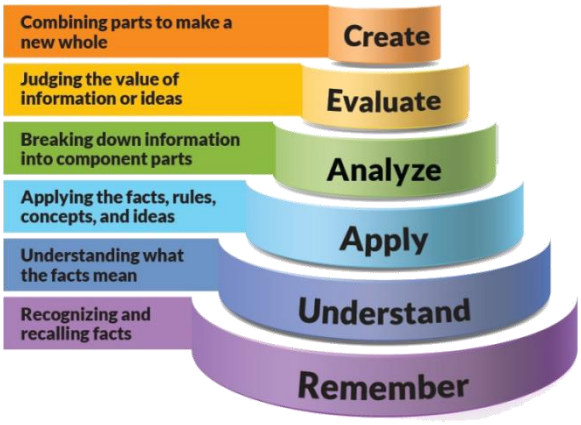

Figure 1: Blooms Taxonomy

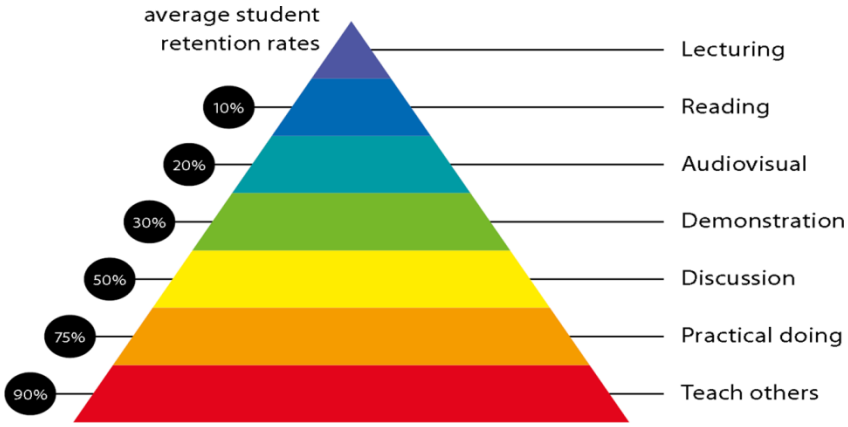

Figure 2: Knowledge retention

Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of _____Graduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	**1 Professional knowledge, grounding & awareness**
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.	**2 Information literacy, gathering & processing**
Problem solvers Take on challenges and opportunities.	**4 Problem solving skills**

Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 Written communication**
	6 Oral communication
	7 Teamwork
Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact**

Practical work:

1. Amplitude modulation & demodulation
2. SSB & DSB
3. Time Division Multiplexing
4. Pulse Code Modulation & Demodulation
5. Differential Pulse Code Modulation & Demodulation
6. Delta Modulation
7. Frequency Shift Keying
8. Phase Shift Keying
9. Differential phase shift keying
10. Companding
11. Linear Block Code- Encoder and Decoder
12. Binary Cyclic Code- Encoder and Decoder
13. Amplitude Shift Keying

Lecture/tutorial times

(Give lecture times in the format below)

Schedule	Time	Semester	Branch	Lec/Tut
Monday	2:00 PM to 3:00 PM	III	CS-A	Lecture
	3:00 PM to 4:00 PM	III	CE-A	Lecture
Tuesday	2:00 PM to 3:00 PM	III	CS-A	Lecture
	3:00 PM to 4:00 PM	III	CE-A	Lecture
Wednesday	3:00 PM to 4:00 PM	III	IT-A	Lecture
Thursday	2:00 PM to 3:00 PM	III	CS-A	Lecture
	3:00 PM to 4:00 PM	III	IT-A	Lecture
Friday	12:00 PM to 1:00 PM	III	IT-A	Lecture
	3:00 PM to 4:00 PM	III	CE-A	Lecture

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for semester examinations.

Details of referencing system to be used in written work

1.	Principles of Digital Communication – Robert G. Gallager Tata McGraw-Hill Publications.
2.	"Principles of Digital Communication and Coding – Andrew J. Viterbi & Jim K. Omura" PHI
3.	"Fundamentals of Communication Systems – John G. Proakis and Masoud Salehi" Tata McGraw-Hill Publications
4.	NPTEL and MIT digital Video lectures
5.	Principles of Digital Communication – Robert G. Gallager Tata McGraw-Hill Publications.

Text books

1.	Lathi, B.P, & Zhi Ding, "Modern Digital and Analog Communication Systems," Fourth Edition, Oxford Press
2.	Dennis Roddy & John Coolen – Electronic Communication (IV Ed.), Prentice Hall of India.
3	Fourauzan B., "Data Communications and Networking", 4th edition, Tata McGraw-Hill Publications.

Additional Materials

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

Class Test 1	15%
Assignment	15%
Project	15%
Seminar	15%
Internal CIE	60%
Final Exam	40%

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in internal component or less than 40% in the end semester will be considered for supplementary assessment in the respective components (i.e internal component or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to

take up the respective components (internal component or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report:

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% of the maximum mark per calendar day.

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.
Do not share your work with other students (except where required for a group activity or assessment)

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Course schedule (subject to change)

(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Weeks 1	Introduction to Communication System, Baseband and Carrier Communication, transmission modes, Baud rate, bit rate, SNR, Channel Bandwidth		Pre-requisites activities
	Weeks 2	Introduction to analog modulation techniques, Bandwidth Requirements in analog modulation techniques, Digital modulation		Tutorials, assignment
	Week 3	Pulse amplitude modulation techniques, sampling theorem, Pulse Transmission over Band Limited Channel, Crosstalk Pulse digital modulation techniques		Quiz-time, assignment
	Week 4	PCM, Bandwidth requirement of digital modulation techniques, Coding techniques		Tutorials, assignment, class test-1
	Week 5	digital communication system, line coding, pulse shaping, scrambling, digital receivers and regenerative repeaters		Quiz-time, assignment
	Week 6	eye diagram, digital carrier system		Tutorials, assignment, class test-2
	Week 7	Fundamentals of probability theory, line coding, pulse shaping example		Quiz-time, assignment
	Week 8	Information rate, Optimum Codes		Tutorials, assignment, class test-3
	Week 9	*EXAM, seminar, problem solving session*		
	Week 10	Huffman Code, Code Efficiency, Methods of Controlling Errors,		Quiz-time, assignment
	Week 11	Types of Errors, Types of Codes, Linear Block Codes, CRC Block Codes		Tutorials, assignment, class test-4

	Week 12	Discrete Messages and Information Content, Entropy, Shannon-Fano coding, Shannon's Theorem, Channel Capacity, Bandwidth, Mutual information and channel capacity, Source coding		Quiz-time, assignment