

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech.		
Course Title	Digital Communication		
Course Code	ECPC19	No. of Credits	3
Course Code of Pre-requisite subject(s)	ECPC10		
Session	July - 2022	Section (if, applicable)	B
Name of Faculty	Dr.N.Gunavathi	Department	ECE
Email	gunavathi@nitt.edu	Telephone No.	0431-250-3315
Name of Course Coordinator(s) (if, applicable)	--		
E-mail	---	Telephone No.	----
Course Type	Core course		
SYLLABUS (APPROVED IN BOS)			
<p>Base band transmission. Sampling theorem, Pulse code modulation (PCM), DM, Destination SNR in PCM systems with noise. Matched filter. Nyquist criterion for zero ISI. Optimum transmit and receive filters. Correlative Coding, M-ary PAM. Equalization-zero forcing and basics of adaptive linear equalizers.</p> <p>BASK, BFSK, and BPSK Transmitter, Receiver, Signal space diagram, Error probabilities.</p> <p>M-ary PSK, M-ary FSK, QAM, MSK and GMSK-Optimum detector, Signal constellation, error probability.</p> <p>Linear block codes- Encoding and decoding. Cyclic codes – Encoder, Syndrome Calculator. Convolutional codes – encoding, Viterbi decoding. TCM.</p> <p>Spread Spectrum (SS) Techniques - Direct Sequence Spread Spectrum modulation, Frequency-hop Spread Spectrum modulation - Processing gain and jamming margin.</p>			
COURSE OBJECTIVES			
<ul style="list-style-type: none"> • To understand the key modules of digital communication systems with emphasis on digital modulation techniques. • To understand the concept channel coding and Spread Spectrum Modulation. 			
COURSE OUTCOMES (CO)			
Course Outcomes	Aligned Programme Outcomes (PO)		
CO 1 : Apply the knowledge of statistical theory of communication understand the Concepts of conventional digital communication system.			

CO 2	: Apply the knowledge of signals and system and evaluate the performance of Binary digital communication system in the presence of noise.	
CO 3	: Apply the knowledge of signals and system and evaluate the performance of M-ary- digital communication system in the presence of noise.	
CO 4	: Apply the knowledge of digital electronics and describe the error control codes like block code, cyclic code.	
CO5	: Describe and analyze the digital communication system with spread spectrum Modulation	
1.	Apply the knowledge of statistical theory of communication and explain the conventional digital communication system.	PO1,PO2,PO9,PO12
2.	Apply the knowledge of signals and system and evaluate the performance of digital communication system with basic modulation techniques in the presence of noise.	PO1, PO2, PO9,PO12
3.	Apply the knowledge of signals and system and evaluate the performance of digital communication system with M-ary modulation techniques in the presence of noise.	PO1, PO2, PO9,PO12
4.	Apply the knowledge of digital electronics and describe the error control codes like block code, cyclic code.	PO1, PO2, PO3, PO9, PO12
5.	Describe and analyze the digital communication system with spread spectrum modulation	PO1, PO2, PO3, PO9, PO12

COURSE PLAN – PART II

COURSE OVERVIEW

Base band transmission: Pulse Code Modulation (PCM), DM. Matched filter. Correlative Coding. Equalizers. Pass Band Transmission: BASK, BFSK, BPSK, M-ary PSK, M-ary FSK, QAM, MSK and GMSK. Error Control Coding- Linear block codes, Cyclic codes. Convolutional codes. Spread Spectrum (SS) Techniques- Direct Sequence Spread Spectrum modulation, Frequency-hop Spread Spectrum modulation.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1.	Second and Third week of August 2022 (3 Contact Hours)	Introduction to digital Communication system, sampling theorem. PCM System, Bandwidth of PCM –TDM system.	Chalk and Talk/PPT
2.	Fourth week of August 2022 (3 Contact Hours)	Destination SNR of PCM System. DM, Matched filter.	
3.	Fifth week of August 2022 (2 Contact Hours)	Nyquist criterion for zero ISI. Optimum transmit and receive filters. Correlative Coding.	
4.	Second week of September 2022 (3 Contact Hours)	M-ary PAM. Equalization- zero-forcing and basics of adaptive linear equalizers.	
5.	Third week of September 2022 (3 Contact Hours)	BASK, BFSK – Transmitter, Receiver, Signal space diagram, Error probabilities.	
6.	Fourth week of September 2022 (3 Contact Hours)	BPSK- Transmitter, Receiver, Signal space diagram, Error probabilities.	

	ASSESSMENT –I			Written exam
7.	Fifth week of September 2022 (3 Contact Hours)	Introduction to M-ary technique M-ary PSK.	Chalk and Talk/PPT	
8.	First week of October 2022 (2 Contact Hours)	M-ary FSK QAM, MSK and GMSK.		
9.	Second week of October 2022 (3 Contact Hours)	MSK and GMSK.		
10.	Third week of October 2022 (3 Contact Hours)	Linear block codes- Encoding and decoding. Cyclic codes – Encoder, Syndrome Calculator.		
	ASSESSMENT-II			Written exam
12.	Fourth week of October 2022 (2 Contact Hours)	Convolutional codes – encoding.	Chalk and Talk/PPT	
13.	First week of November 2022 (3 Contact Hours)	Viterbi decoding. TCM, Spread Spectrum (SS) Techniques-Introduction.		
14.	Second week of November 2022 (2 Contact Hours)	Direct Sequence Spread Spectrum modulation		
15.	Third and fourth week of November 2022 (5 Contact Hours)	Frequency-hop Spread Spectrum modulation - Processing gain and jamming margin.		
	FINAL ASSESSMENT			Descriptive Exam
COURSE ASSESSMENT METHODS (shall range from 4 to 6)				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	ASSESSMENT I Descriptive Type Examination (2 Units)	As per CCM Common schedule	1 hours	20
2	ASSESSMENT II Descriptive Type Examination (2 Units)	As per CCM Common schedule	1 hours	20
3	Assessment III – (SEMINAR / ASSIGNMENT/CLASS TEST/PERFORMANCE IN THE CLASS)			10
4	Compensation Assessment (4 units)	As per Institute Common schedule	1 hours	20

5	END SEMESTER Descriptive Type Examination (Unit 1,2,3,4 & 5)	As per Institute Common schedule	3 hours	50
*mandatory; refer to guidelines on page 4				
COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)				
<ol style="list-style-type: none"> 1. Feedback from the students during class committee meeting. 2. Queries through questionnaire. 3. Course Attainment is calculated through Direct tools (Exams) 				
COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)				
<p><u>MODE OF CORRESPONDENCE (email/ phone etc)</u> Correspondence:</p> <ol style="list-style-type: none"> 1. All the students are advised to come to class regularly. All the correspondence (schedule of classes/ schedule of assessment/ course material/ any other information regarding this course) will be intimated in the class / over phone. 2. Queries (if required) to the course teacher shall be emailed to the email id specified. 				
<p><u>COMPENSATION ASSESSMENT POLICY</u></p> <ol style="list-style-type: none"> 1. Attending all the assessments is MANDATORY for every student. 2. If any student is not able to attend either one or both of the continuous assessments I & II due to genuine reason, student is permitted to attend the compensation assessment (CPA) with only 20 % weightage for both the cases. 3. At any case, CPA will not be considered as an improvement test. 4. If any student is not able to attend the End semester due to genuine reason with valid attestation, student is permitted to take up FORMATIVE ASSESSMENT. 				
<p><u>ATTENDANCE POLICY</u> (A uniform attendance policy as specified below shall be followed)</p> <ul style="list-style-type: none"> ➤ At least 75% attendance in each course is mandatory. ➤ A maximum of 10% shall be allowed under On Duty (OD) category. ➤ Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade. 				
<p><u>ACADEMIC DISHONESTY & PLAGIARISM</u></p> <ul style="list-style-type: none"> ➤ Possessing a mobile phone, carrying bits of paper, talking to other students, copying 				

from others during an assessment will be treated as punishable dishonesty.

- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION

Queries and feedback may also be emailed to the Course Faculty directly at gunavathi@nitt.edu

FOR APPROVAL

Course Faculty _____

CC-Chairperson _____

HOD _____

(Dr.R.K.Jeyachitra)