NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE PLAN – PART I

Name of the programme and specialization	M.Tech - Communication Systems – Ist-Year		
Course Title	Advanced Digital Communication		
Course Code	EC602	No. of Credits	03
Course Code of Pre-requisite subject(s)	EC601	Linear Algebra and Stochastic Processes	
Session	~~July~~ / January 2020	Section (if, applicable)	A / B
Name of Faculty	Dr. R. K. JEYACHITRA	Department	Electronics and Communication Engineering
Email	jeyachitra@nitt.edu	Telephone No.	0431 2503320
Name of Course Coordinator(s) (if, applicable)	NONE		
Official E-mail	NIL	Telephone No.	NIL
Course Type	✓ Core course	... Elective course	

Syllabus (approved in BoS)

Course Content

Baseband data transmission- Nyquist criterion for zero ISI, Correlative level coding, Optimum design of transmit and receive filters, Equalization.

Passband Digital transmission- Digital modulation schemes, Carrier synchronization methods, Symbol timing estimation methods.

Error control coding - Linear block codes, cyclic codes-encoding and decoding, Non-binary codes, Convolutional codes, Decoding of convolutional codes, Trellis coded modulation, Interleaver, Turbo coding, Performance measures.

Spread spectrum communication- D S and F H spread spectrum, CDMA system based on FH and DS spread spectrum signals, Applications, Synchronization of spread spectrum signals.

Multichannel and Multicarrier communication Systems, Multi user communication systems.

Text Books
1. J.G.Proakis," Digital Communication (4/e)", McGraw- Hill, 2001
2. S. Haykin, "Communication systems (4/e)",John Wiley, 2001
3. B.P. Lathi, Zhi Ding, "Modern Digital and Analog Communication Systems (4/e)",Oxford University Press, 2010

Reference Books
1. S.Lin & D.J.Costello, Error Control Coding (2/e) Pearson, 2005
2. Recent literature in Advanced Digital Communication.

COURSE OBJECTIVES

This subject gives an in-depth knowledge and advancement in digital communication systems. It introduces some of the upcoming technologies like Multiuser - communication, Multi-channel and Multicarrier communication technologies.

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
At the end of the course student will be able	
1. Understand the operation, theoretical analysis and design of baseband, pass band data transmission systems	PO1,PO2,PO3,PO4, PO5,
2. Design and implement various digital encoders and decoders	PO1,PO2,PO3,PO4, PO5,PO7,PO9,PO10
3. Summarize spread spectrum technology and its application	PO1,PO3,PO4, PO5,PO9,PO10
4. Compare single carrier and multicarrier communication systems	PO1,PO2,PO3,PO4, PO5,PO9,PO10
5. Do research in the digital communication systems	PO5,PO6,PO9,PO10

COURSE PLAN – PART II

COURSE OVERVIEW

Students can understand the concept of Baseband and Passband digital transmission systems. Students will get exposure to the Error control coding and Spread spectrum techniques. In addition to that students will know the technological advancement in digital communication systems such as Multiuser - communication, Multi-channel and Multicarrier communication technologies.

COURSE TEACHING AND LEARNING ACTIVITIES   (Add more rows)

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	1st WEEK 6th to 10th January (3 Contact Hours)	Introduction to Baseband data transmission, Nyquist criterion for zero ISI and Correlative level coding	Lecture C&T/ PPT/OHP or Any suitable mode
2	2nd WEEK 13th to 17th January (3 Contact Hours)	Optimum design of transmit and receive filters	

3	3rd WEEK 20th to 24th January **(3 Contact Hours)**	Equalization and Introduction to Passband Digital transmission	Lecture C&T/ PPT/OHP or Any suitable mode
4	4th WEEK 27th to 31st January **(3 Contact Hours)**	Digital modulation schemes-coherent and non-coherent modulation	
5	5th WEEK 3rd to 7th February **(3 Contact Hours)**	Carrier synchronization methods	
6	6th WEEK 10th to 14th February **(3 Contact Hours)**	Symbol timing estimation methods	
		ASSESSMENT I – 20 MARKS	**WRITTEN TEST**
7	7th WEEK 17th to 21st February **(3 Contact Hours)**	Introduction to Error control coding, Linear block codes, cyclic codes encoding and decoding	Lecture C&T/ PPT/OHP or Any suitable mode
		ASSESSMENT II – 5 MARKS	**ASSIGNMENT**
8	8th WEEK 24th to 28th February **(3 Contact Hours)**	Non-binary codes, Convolutional codes, Decoding of Convolutional codes	Lecture C&T/ PPT/OHP or Any suitable mode
9	9th WEEK 2nd to 6th March **(3 Contact Hours)**	Trellis coded modulation, Interleaver, Turbo coding, Performance measures	
10	10th WEEK 9th to 13th March **(3 Contact Hours)**	Introduction to Spread spectrum communication, D S and F H spread spectrum	
11	11th WEEK 16th to 20th March **(3 Contact Hours)**	CDMA system based on FH and DS spread spectrum signals	
12	12th WEEK 23rd to 27th March **(3 Contact Hours)**	Applications, Synchronization of spread spectrum signals	
		ASSESSMENT III – 20 MARKS	**WRITTEN TEST**
13	13th WEEK 30th March to 3rd April **(3 Contact Hours)**	Introduction to advanced topics in ADC	Lecture C&T/ PPT/OHP or Any suitable mode
14	14th WEEK 6th to 10th April **(3 Contact Hours)**	Multichannel and Multicarrier communication Systems	

15	15th WEEK 13th to 17th April **(3 Contact Hours)**	Multi user communication systems	
		ASSESSMENT IV – 5 MARKS	**SEMINARS**
	FINAL ASSESSMENT		**WRITTEN TEST**

- **C & T - C**halk and **T**alk
- **PPT - P**ower **P**oint
- **OHP - O**verhead projector

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	ASSESSMENT I WRITTEN TEST (UNIT 1 & 2)	2nd Week of February	60 Minutes	20
2	ASSESSMENT II ASSIGNMENT	3rd Week of February	5 days	5
3	ASSESSMENT III WRITTEN TEST (UNIT 3 & 4)	4th Week of March	60 Minutes	20
4	ASSESSMENT IV SEMINARS	3rd Week of April	15 Minutes	5
CPA	COMPENSATION ASSESSMENT (WRITTEN TEST)	4th Week of April	60 Minutes	Please refer course policy for more details
5	FINAL ASSESSMENT* ALL UNITS (WRITTEN TEST)	1st Week of May	180 Minutes	50

*mandatory; refer to guidelines on page 6

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

- Feedback from the students during class committee meetings.
- Individual Subject feedback through MIS website at the end of the semester.

COURSE POLICY (including compensation assessment to be specified)

MODE OF CORRESPONDENCE (email/ phone etc.)

➢ All the students are advised to check their NITT WEBMAIL regularly. All the correspondence (schedule of classes/ schedule of assessment/ any other information regarding this course) will be done through their webmail only.

➢ Queries (if required) to the course teacher shall only be emailed to the email id specified by the teacher.

COMPENSATION ASSESSMENT

➢ Attending all the assessments is MANDATORY for every student.

> If any student is not able to attend any one of the continuous assessments descriptive examination due to genuine reason, the student is permitted to attend the compensation assessment (CPA) with 20% weightage.

> At any case, CPA will not be considered as an improvement test.

> Submission of assignment and presentation of the seminar are MANDATORY for every student within the stipulated time failing which 10% weightage will not be considered for the final grade assessment.

> Finally, every student is expected to score a minimum of 40% in the total assessments (1, 2, 3, 4, and 5) to pass the course. Otherwise, the student would be declared fail and 'F' grade will be awarded.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

> 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.

ACADEMIC HONESTY & PLAGIARISM

> 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, IF ANY

The faculty is available for consultation at times as per the intimation given by the faculty.

FOR APPROVAL

Course Faculty _____   CC-Chairperson _____   HOD _____

(Dr. R. K. JEYACHITRA)

(Dr. B. Rebekka)

Guidelines

a) The number of assessments for any theory course shall range from 4 to 6.

b) Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.

c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.

d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.

f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.

g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.