

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

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech. (ECE)		
Course Title	WIRELESS COMMUNICATION		
Course Code	ECPC27	No. of Credits	3
Course Code of Pre-requisite subject(s)	None		
Session	July 2018	Section (if, applicable)	A
Name of Faculty	Dr. B. Rebekka	Department	ECE
Email	rebekka@nitt.edu	Telephone No.	9894478823
Name of Course Coordinator(s) (if, applicable)			
E-mail		Telephone No.	
Course Type	Core course		
<b>Syllabus (approved in BoS)</b>			
<b>Course Content</b>			
Introduction to Wireless Communication. Cellular concept. System design fundamentals. Coverage and Capacity improvement in Cellular system. Technical Challenges.			
Mobile Radio Propagation; Reflection, Diffraction, Fading. Multipath propagation. Statistical characterization of multipath fading. Diversity Techniques.			
Path loss prediction over hilly terrain. Practical link budget design using Path loss models. Design parameters at base station. Antenna location, spacing, heights and configurations.			
Multiple access techniques; FDMA, TDMA and CDMA. Spread spectrum. Power control. WCDMA. CDMA network design. OFDM and MC-CDMA.			
GSM.3G, 4G (LTE), NFC systems, WLAN technology. WLL. HiperLAN. Ad hoc networks. Bluetooth.			
<b>COURSE OBJECTIVES</b>			
<ul style="list-style-type: none"> <li>To get an understanding of mobile radio communication principles, types and to study the recent trends adopted in cellular and wireless systems and standards.</li> </ul>			



<b>COURSE OUTCOMES (CO)</b>	
<b>Course Outcomes</b>	<b>Aligned Programme Outcomes (PO)</b>
CO1: Apply the knowledge of basic communication systems and its principles.	
CO2: Describe the cellular concept and analyze capacity improvement Techniques.	
CO3: Mathematically analyze mobile radio propagation mechanisms.	
CO4: Summarize diversity reception techniques.	
CO5: Design Base Station (BS) parameters and analyze the antenna configurations.	
CO6: Analyze and examine the multiple access techniques and its application.	
CO7: Assess the latest wireless technologies.	

<b>COURSE PLAN – PART II</b>			
<b>COURSE OVERVIEW</b>			
This course cover the basic principles that deals with how information can effectively using radio.			
<b>COURSE TEACHING AND LEARNING ACTIVITIES</b>			
<b>S.No.</b>	<b>Week/ Contact Hours</b>	<b>Topic</b>	<b>Mode of Delivery</b>
1	1 <sup>st</sup>	Introduction to wireless communication. Cellular concept: Frequency reuse, Channel assignment strategies, Handoff strategies	Chalk and Talk, PPT
2	2 <sup>nd</sup>	Handoff considerations. Interference and system capacity. CCI and ACI. Improving coverage and capacity: Cell splitting	Chalk and Talk, PPT
3	3 <sup>rd</sup>	Sectoring, Repeaters for range extension, Microcell concept. Technical Challenges. Causes of mobile radio propagation path loss.	Chalk and Talk, PPT
4	4 <sup>th</sup>	Free space propagation model. Reflection from perfect conductors, Ground reflection model. Diffraction: Knife edge diffraction model.	Chalk and Talk, PPT



5	5 <sup>th</sup>	Small scale fading and multipath propagation. Doppler shift, Delay spread, ISI. Impulse response of a multipath channel. Parameters of mobile multipath channels.	Chalk and Talk, PPT
6	6 <sup>th</sup>	Diversity techniques. Prediction of propagation loss. Propagation loss data from measurements. Prediction over a hilly terrain.	Chalk and Talk, PPT
7	7 <sup>th</sup>	Practical link budget design using path loss models. Design parameters at base station: Antenna locations, Antenna spacing.	Chalk and Talk, PPT
8	8 <sup>th</sup>	Antenna heights, Antenna configurations. Introduction to Multiple access. Frequency division multiple access (FDMA), Time division multiple access (TDMA)	Chalk and Talk, PPT
9	9 <sup>th</sup>	Spread spectrum multiple access: FHMA, CDMA and Hybrid techniques. WCDMA. Capacity of multiple access schemes.	Chalk and Talk, PPT
10	10 <sup>th</sup>	Power control scheme. OFDM Orthogonal Frequency division multiplexing. OFDMA. Multi carrier code division multiple access	Chalk and Talk, PPT
11	11 <sup>th</sup>	GSM: System overview, Air interface, Logical and Physical channels. 3G system overview. 3GPP LTE: System overview, Physical layer procedures.	Chalk and Talk, PPT
12	12 <sup>th</sup>	WLAN technology. WLL. HiperLAN. Bluetooth technology. Exposure to Ad Hoc networks.	Chalk and Talk, PPT

**COURSE ASSESSMENT METHODS (shall range from 4 to 6)**

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	<b>ASSESSMENT I</b> Descriptive Type Examination (2 Units )		60 Minutes	20
2	<b>ASSESSMENT II</b> Descriptive Type Examination (2 Units )		60 minutes	20
3	<b>SEMINAR/ASSIGNMENT</b>			10
CPA	<b>Compensation Assessment*</b>		60 minutes	
4	<b>Final Assessment</b>		180 minutes	50



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

1. Direct feedback from the students by having face-to-face meeting individually and as the class as a whole.
2. Feedback from the students during the class committee meetings

**COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)**

**MODE OF CORRESPONDENCE (email/ phone etc)**

Students may contact the teacher through the e-mail mentioned

**COMPENSATION ASSESSMENT POLICY**

Attending all the assessments is MANDATORY for every student.

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.

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

**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 DISHONESTY & 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**

Students may fix appointments for detailed discussion by sending email to [rebekka@nitt.edu](mailto:rebekka@nitt.edu) two days prior to the desired appointments date with the topic to discuss. The students must come prepared for the discussion with background preparation. Minor doubts will be clarified after the contact hours without any prior appointment.

**FOR APPROVAL**

Course Code: EGPC27      No. of Credits: 3

Course Faculty: B. REBEKKA      CC-Chairperson: M. AN      HOD: [Signature]

[Signature]  
Department: ECE  
Telephone No. 9894474873  
Course Type: Core course

Approved in [ ]

Course Objectives

1. Understand the basic concepts of Wireless Communication, Cellular concept, System design fundamentals, Coverage and Capacity improvement in Cellular system, Technical Challenges.

2. Mobile Radio Propagation: Reflection, Diffraction, Fading, Multipath propagation, Statistical characterization of multipath fading, Diversity Techniques.

3. Path loss prediction over hilly terrain, Practical link budget design using Path loss models, Design parameters at base station: Antenna location, spacing, heights and configurations.

4. Multiple access techniques: FDMA, TDMA and CDMA; Spread spectrum, Power control, WCDMA/CDMA network design, OFDM and MC-CDMA.

5. GPRS/GPRS (GPRS), NFC systems, VLAN technology, WLAN, HiperLAN, Ad hoc networks, Bluetooth.

Course Objectives

1. Develop understanding of mobile radio communication principles, types and to study the technical standards adopted in cellular and wireless systems and standards.