M. TECH - 2st year

## DEPARTMENT OF ECE

# NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIF APPALLI

Course Title	TEMPLATE  Broadband Wireless Technologies				
Course Code	EC604	No. of	3		
Department	ECE	Credits			
	ECE	Faculty	Dr.P.Muthu Chidambara		
Pre-requisites Course Code	Engineering Electromagnetics, Digital Communication				
Course Coordinator(s) (if, applicable)	Dr.P.Muthu Chidambara nathan				
Other Course	muthuc@nitt.edu	Telephone No.	0431-2503309		
Teacher(s)/Tutor(s) E-mail					

## COURSE OVERVIEW

## COURSE CONTENT

Introduction to Wireless Communication. The Cellular concept, System design, Capacity improvement in cellular systems, Co channel interference reduction. Intelligent cell concept and applications. Technical Challenges.

Mobile radio propagation: Reflection, Diffraction. Fading. Multipath Propagation. Channel modeling, Diversity Schemes and Combining Techniques.

Design parameters at the base station, Practical link budget design using path loss models. Smart antenna systems, Beamforming. MIMO Systems. RAKE receiver.

Multiuser Systems: CDMA- Principle, Network design, Link capacity, Power control, WCDMA-Network planning, MC-CDMA, OFDM, Cellular mobile communication beyond 3G.

GSM, IS-95, GPRS, UMTS, WLAN, WPAN, WMAN, Ultra Wideband communications, 4G and beyond 4G.

## COURSE OBJECTIVES

 To expose the students to understand mobile radio communication principles and to study the recent trends adopted in cellular systems and wireless standards.

OURS	SE OUTCOMES (CO		Al' and Decreemen	
			Aligned Programme Outcomes (PO)	
Course	Outcomes	Ilular system design and technical	PO1 – H	
		ilulai system design and		
	challenges.			
	CO2: Compare/ Contra	PO4 – H		
	in mobile radio prop			
	and the multipath cha	nnel.		
	CO3: Summarize the	PO4 – H		
	smart antenna, beam			
			no	
	CO4: Compare/ Cor	itrast Multiuser Systems, CDMA,	PO1 – H PO3 – M	
	WCDMA network plan	nning and OFDM Concepts.	L 0.9 – III	
		e principles and applications of		
			PO 10 - H	
	wireless systems and			
COUF	RSE TEACHING AND	LEARNING ACTIVITIES		
		Topic	Mode of Delivery	
S.No.	Week	Topic		
1.	Week 1	Introduction to Wireless	Chalk and talk and Power Point	
1.	, , ,	Communication, The Cellular	Presentation	
		concept, System design,		
E				
		Problems		
2	Week 2	Problems  Capacity improvement in cellular	Chalk and talk	
2.	Week 2	Problems  Capacity improvement in cellular systems, Problems, Co channel	Chalk and talk	
2.	Week 2	Problems  Capacity improvement in cellular	Chalk and talk	
		Problems  Capacity improvement in cellular systems, Problems, Co channel interference reduction	Chalk and talk  Chalk and talk	
2.		Problems  Capacity improvement in cellular systems, Problems, Co channel interference reduction  Intelligent cell concept and		
		Capacity improvement in cellular systems, Problems, Co channel interference reduction  Intelligent cell concept and applications, Technical Challenges, Mobile radio		
		Capacity improvement in cellular systems, Problems, Co channel interference reduction  Intelligent cell concept and applications, Technical Challenges, Mobile radio propagation	Chalk and talk	
	. Week 3	Capacity improvement in cellular systems, Problems, Co channel interference reduction  Intelligent cell concept and applications, Technical Challenges, Mobile radio propagation  Reflection, Diffraction, Problems,		
3	. Week 3	Capacity improvement in cellular systems, Problems, Co channel interference reduction  Intelligent cell concept and applications, Technical Challenges, Mobile radio propagation  Reflection, Diffraction, Problems, Wireless Channels, Fading	Chalk and talk  Chalk and talk	
3	. Week 3	Capacity improvement in cellular systems, Problems, Co channel interference reduction  Intelligent cell concept and applications, Technical Challenges, Mobile radio propagation Reflection, Diffraction, Problems, Wireless Channels, Fading Multipath Propagation. Channel	Chalk and talk	
3	. Week 3	Capacity improvement in cellular systems, Problems, Co channel interference reduction  Intelligent cell concept and applications, Technical Challenges, Mobile radio propagation  Reflection, Diffraction, Problems, Wireless Channels, Fading  Multipath Propagation. Channel modeling, Diversity Schemes and Combining Techniques	Chalk and talk  Chalk and talk  Chalk and talk	
3	. Week 3 . Week 4 . Week 5	Capacity improvement in cellular systems, Problems, Co channel interference reduction  Intelligent cell concept and applications, Technical Challenges, Mobile radio propagation Reflection, Diffraction, Problems, Wireless Channels, Fading Multipath Propagation. Channel modeling, Diversity Schemes and Combining Techniques Design parameters at the base station, Mobile Station	Chalk and talk  Chalk and talk  Chalk and talk  Chalk and talk	
3. 4 5	. Week 3 . Week 4 . Week 5	Capacity improvement in cellular systems, Problems, Co channel interference reduction  Intelligent cell concept and applications, Technical Challenges, Mobile radio propagation Reflection, Diffraction, Problems, Wireless Channels, Fading  Multipath Propagation. Channel modeling, Diversity Schemes and Combining Techniques  Design parameters at the base	Chalk and talk  Chalk and talk  Chalk and talk  Chalk and talk	

	. Week 8	Beamforming, MIMO Systems		Chalk and talk	
9.	Trock 5	RAKE receiver	, Multiuser	Chalk and talk	
10	11001110	CDMA- Principle, Network design, Link capacity, Power control		Chalk and talk	
11	TOOK 11	WCDMA-Network planning, MC-CDMA		Chalk and talk and Power Point	
12	1100K 12	OFDM, Cellular mobile communication beyond 3G		Chalk ard talk and Power Point Presentation	
13	TTOOK 10	GSM, GPRS, IS 95		Chalk and talk and Power Point Presentation	
14	Treek 14	UMTS, WLAN, WPAN, WMAN, Ultra Wideband communications		Chalk and talk and Power Point Presentation	
15	. Week 15	4G and beyond 4G		Chalk and talk and Power Point Presentat on	
				Present	tat on
COUR	SE ASSESSMENT			Present	tat on
COUR S.No.	SE ASSESSMENT Mode of Assessment		Duration	Present	% Weightage
5.No. 1.	Mode of Assessment Written Test -1 (Unit 1, 2)	METHODS	fogia foame	Present 20	at on
1. 2.	Mode of Assessment Written Test -1 (Unit 1, 2) Written Test – 2 (Unit 3, 4)	METHODS Week/Date	Duration	Present	at on
1. 2. 3.	Mode of Assessment Written Test -1 (Unit 1, 2) Written Test - 2 (Unit 3, 4) Seminar/ assignment	METHODS Week/Date Week-7	Duration 1 hour	Present 20	at on
1. 2.	Mode of Assessment Written Test -1 (Unit 1, 2) Written Test - 2 (Unit 3, 4) Seminar/	METHODS Week/Date Week-7 Week - 13	Duration 1 hour	20 20	at on

#### **Text Books**

- 1. A.F.Molisch, Wireless Communications, Wiley, 2005.
- 2. A.Goldsmith, Wireless Communications, Cambridge University Press, 2005.

#### Reference Books

**Course Faculty** 

- 1. P.Muthu Chidambara Nathan, "Wireless Communication"s, PHI, 2013.
- 2. Ke-Lin Du, M.N.S.Swamy, "Wireless Communication Systems", Cambridge University Press, 2010.
- 3. K.Fazel & S. Kaiser," Multi-carrier and Spread Spectrum Systems", Wiley, 2003
- 4. S.G. Glisic, "Advanced Wireless Communications", 4G Technologies, Wiley, 2004.
- 5. W.C.Y.Lee, "Mobile Communication Engineering", (2/e), McGraw- Hill, 1998.
- 6. S.G. Glisic, "Adaptive CDMA", Wiley, 2003

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)
Class Committee meetings, Student Feedback
COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)
Min. 75% attendance is required for the students to appear for end semester examination Passing Min.: As per NITT norms
ADDITIONAL COURSE INFORMATION
The Course Coordinator is available for consultation at times that are displayed on the coordinator's office notice board. Queries may also be emailed to the Course Coordinator directly at muthuc@nitt.edu
FOR SENATE'S CONSIDERATION

CC-Chairperson \_\_\_\_

HOD

(Dr. B. Dubkke)