

Short Syllabus

BECE307L

Wireless and Mobile Communications

(2-0-0-2)

MobileRadio Propagation: Large Scale Fading - Cellular concept, Propagation mechanisms;
Mobile Radio Propagation: Small Scale Fading - Rayleigh and Rician fading; Wireless Systems
and Standards - AMPS, GSM, GPRS; OFDM Technology - SNR and BER performance;
Diversity Techniques - Multiple Antenna Wireless Systems, Types of Diversity; MIMO
Technology - Zero Forcing and Minimum Mean Square Error receivers, Spatial Multiplexing;
Next Generation Wireless Communication- 5G Wireless Technologies.

Course Code	Course Title	L	T	P	C
BECE307L	Wireless and Mobile Communications	2	0	0	2
Pre-requisite	BECE306L, BECE306P	Syllabus version			
		1.0			
Course Objectives:					
1. To familiarize the concepts of wireless communication. 2. To teach students the fundamentals of multipath fading and propagation models. 3. To acquaint students with different generations of mobile networks. 4. To describe the diversity and MIMO schemes as applied in wireless communication.					
Course Outcome:					
The students will be able to 1. Infer the wireless channel using path loss models and interpret the impact of multipath channel parameters. 2. Examine the functions and services of cellular networks. 3. Demonstrate the principles of multicarrier modulation. 4. Select a suitable diversity technique to combat the multipath fading effects. 5. Identify suitable MIMO techniques to enhance the spectrum efficiency. 6. Describe the features of next generation wireless technologies.					
Module:1	Mobile Radio Propagation: Large Scale Fading	6 hours			
Overview of Wireless Communication, Cellular concept – Frequency reuse – Channel assignment strategies – Handoff strategies – Interference and system capacity – Trunking and grade of service – Improving coverage and capacity in cellular system. Propagation mechanisms, Free space model, Two ray model, Outdoor and indoor propagation models, Link budget design.					
Module:2	Mobile Radio Propagation : Small Scale Fading	4 hours			
Small scale multipath propagation, Parameters of multipath channels, Types of small scale fading, Rayleigh and Rician fading.					
Module:3	Wireless Systems and Standards	3 hours			
AMPS,GSM, GPRS, EDGE, UMTS, LTE, LTE-A.					
Module:4	OFDM Technology	3 hours			
Introduction and Challenges in Multicarrier Systems, OFDM System Model - IFFT/ FFT Transceiver Mathematical Model - Cyclic Prefix, PAPR and reduction techniques - SNR and BER performance - ICI-SC-FDMA.					
Module:5	Diversity Techniques	4 hours			
Multiple Antenna Wireless Systems-System Model, Types of Diversity: Antenna, Frequency, Time; Deep Fade Analysis with Diversity, Optimal Receiver Combining, MRC, EGC, Diversity Order.					
Module:6	MIMO Technology	5 hours			
MIMO System Model – Zero Forcing and Minimum Mean Square Error receivers - Singular Value Decomposition - Channel Capacity - Optimal Water filling Power Allocation - Beam forming - Spatial Multiplexing, BLAST Architectures, Distributed MIMO.					
Module:7	Next Generation Wireless Communication	3 hours			
5G Wireless Technologies - NR Standard, filter bank multicarrier, Non-orthogonal multiple access, D2D, small cells, mmWave, Index Modulation - 6G Key enablers - Reconfigurable					

intelligent surfaces.			
Module:8		Contemporary issues	
		2 hours	
		Total Lecture hours:	
		30 hours	
Text Book(s)			
1.	Rappaport, T.S., Wireless Communications: Principles and Practice, 2018, (Reprint), Pearson Education, Noida, India.		
Reference Books			
1.	Andrea Goldsmith, Wireless Communications, 2020, 2 nd Edition, Cambridge University Press		
2.	Aditya K. Jagannatham," Principles of Modern Wireless Communications Systems", 2015, McGraw Hill Education		
3.	T L Singal, Wireless Communications, 2014, (Reprint), Tata McGraw Hill Education, 1 st edition, New Delhi, India.		
4.	Keith Q T Zhang, Wireless Communications: Principles, Theory and Methodology, 2016, 1 st edition, John Wiley & Sons, West Sussex, UK.		
Mode of Evaluation: Continuous Assessment Test, Digital Assignment, Quiz and Final Assessment Test			
Recommended by Board of Studies		14-05-2022	
Approved by Academic Council		No. 66	Date 16-06-2022