

Course Code	ECE5XX		
Course Name	Wireless Communication : Evolution from 3G to 5G		
Credits	4		
Course Offered to	UG / PG		
Course Description	development of cellular standards from 3G to 5G, and Wi-Fi standards from IEEE 802.11a to IEEE 802.11ac. This course will introduce students to channel capacity in non-fading and fading channel conditions, multiple access techniques (including multiple antenna systems), cellular system design, and advanced wireless techniques such as Multi-user MIMO, Carrier Bonding/ Aggregation etc. Lectures will be based on required reading from textbook / reference book sections, magazine and journal articles or supplemental handouts. Active class participation is mandatory - required reading must be done before class, and in-class time will be divided between lectures, group discussions and on-spot presentations. The course grade will be based on class participation, several paper surveys based on the required and supplemental reading, several homework assignments based on the required reading, end semester		
Pre-requisites			
Pre-requisite (Mandatory)	Pre-requisite (Desirable)	Pre-requisite(other)	
ECE240 Principles of Communication Systems	ECE5xx Principles of Digital Communication	Matlab	
Post Conditions			
CO1	CO2	CO3	CO4
Students will be able to differentiate between multiple access schemes and state their pros and cons.	Students will be able to analyze the benefits of MIMO wireless systems	Students will be able to analyze the impact of channel conditions on the maximum channel capacity	Students will able to simulate the performance of adaptive modulation and coding schemes in different channel conditions.
Weekly Lecture Plan			
Week Number	Lecture Topic	COs Met	Assignment/Labs/Tutorial
1,2,3,4	Statistical Multipath Channel models Multiple Access techniques (FDM, TDM, CDMA, OFDMA, SC-FDMA, FDD-TDD) and Interference Management Capacity in Wireless Channels	C01 C03	End of chapter problems from the text
5,6,7,8,9	Transmit Precoding and Receiver Shaping Parallel Decomposition of the MIMO Channel MIMO Channel Capacity Beamforming The V-BLAST architecture Space-time codes Diversity-Multiplexing Trade-offs MIMO-OFDM Systems Multi-User MIMO Multi-User detection Cooperative Relaying Techniques	C02	End of chapter problems from the text
10,11	Adaptive Modulation Adaptive coding schemes Adaptive Modulation and Coding schemes Trellis coded modulation	C04	End of chapter problems from the text
12,13	Standards MIMO techniques in Wi-Fi standards Instructor chosen topic Project Presentations	C02	End of chapter problems from the text
Assessment Plan			
Type of Evaluation	% Contribution in Grade		
Assignment	15		
Class presentation	10		
Final Project	30		
Quizzes and short test	15		
End-Sem	20		
Class participation	10		
Resource Material			
Type	Title		
Textbook	1. Wireless Communication by Andrea Goldsmith		
	2. Fundamentals of Wireless Communication by David Tse and Pramod Viswanath		
Journals/ Magazine papers	From IEEE, Open source etc.		