

Advanced 3G and 4G Wireless Mobile Communications - Video course

COURSE OUTLINE

This course is intended as an introductory course for Postgraduate Students in the areas of Communications and Signal Processing. Students in their final year undergraduate degree in ECE, who would like to specialize in this area, will also find this course revealing. The treatment would look at current and upcoming wireless communications technologies for broadband wireless access.

COURSE DETAIL

Sl. No	Topic	No. of Lectures
1	Wireless Communications and Diversity <ol style="list-style-type: none"> 1. Fast Fading Wireless Channel Modeling 2. Rayleigh/Ricean Fading Channels 3. BER Performance in Fading Channels 4. Diversity modeling for Wireless Communications 5. BER Performance Improvement with diversity 6. Types of Diversity – Frequency, Time, Space 	6
2	Broadband Wireless Channel Modeling <ol style="list-style-type: none"> 1. WSSUS Channel Modeling, RMS Delay Spread 2. Doppler Fading, Jakes Model, Autocorrelation 3. Jakes Spectrum 4. Impact of Doppler Fading 	4
3	Cellular Communications <ol style="list-style-type: none"> 1. Introduction to Cellular Communications 2. Frequency reuse 3. Multiple Access Technologies 4. Cellular Processes - Call Setup, Handover etc. 5. Teletraffic Theory 	5
4	CDMA <ol style="list-style-type: none"> 1. Introduction to CDMA 2. Walsh codes, Variable tree OVSA 3. PN Sequences 4. Multipath diversity, RAKE Receiver 5. CDMA Receiver Synchronization 	5
5	OFDM <ol style="list-style-type: none"> 1. Introduction to OFDM 2. Multicarrier Modulation and Cyclic Prefix 3. Channel model and SNR performance 4. OFDM Issues – PAPR 5. Frequency and Timing Offset Issues 	5



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Electronics & Communication Engineering

Pre-requisites:

- a. An undergraduate course in Communication Theory.
- b. An undergraduate course in Mobile or Wireless Communications.

Additional Reading:

1. Introduction to Space-Time Wireless Communications – Arogyaswami Paulraj – Cambridge University Press.
2. Digital Communications – John G Proakis – McGraw Hill Science/Engineering/Math.
3. Wireless Communications – Andreas Molisch – Wiley IEEE Press.
4. Mobile Wireless Communications – Mischa Schwartz – Cambridge University Press.

Hyperlinks:

Will be provided in the lectures.

Coordinators:

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6	<p style="text-align: center;">MIMO</p> <ol style="list-style-type: none"> 1. Introduction to MIMO, MIMO Channel Capacity 2. SVD and Eigenmodes of the MIMO Channel 3. MIMO Spatial Multiplexing – BLAST 4. MIMO Diversity – Alamouti, OSTBC, MRT 5. MIMO - OFDM 	5
7	<p style="text-align: center;">UWB (Ultrawide Band)</p> <ol style="list-style-type: none"> 1. UWB Definition and Features 2. UWB Wireless Channels 3. UWB Data Modulation 4. Uniform Pulse Train 5. Bit-Error Rate Performance of UWB 	5
8	<p style="text-align: center;">3G and 4G Wireless Standards</p> <ol style="list-style-type: none"> 1. GSM 2. GPRS 3. WCDMA 4. LTE 5. WiMAX 	5

References:

1. Fundamentals of Wireless Communications – David Tse and Pramod Viswanath, Publisher - Cambridge University Press.
2. Wireless Communications: Andrea Goldsmith, Cambridge University Press.
3. Wireless Communications: Principles and Practice –Theodore Rappaport - Prentice Hall.
4. MIMO Wireless Communications – Ezio Biglieri – Cambridge University Press.