ADVANCED MOBILE COMMUNICATIONS

Course Code: 13EC2111

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Course educational objectives:

1. This course is intended as an advanced course for Postgraduate Students in the areas of wireless communications and Signal Processing.
2. To study the state-of-the-art techniques of mobile communications networks;

Course outcomes:

1. This course leads to current and upcoming wireless communications technologies for broadband wireless access network design and research.
2. Research in system evaluation methods used in the design of mobile communications networks.

UNIT-I

WIRELESS COMMUNICATIONS AND DIVERSITY:

Fast Fading Wireless Channel Modeling, Rayleigh/Ricean Fading Channels, BER Performance in Fading Channels, Diversity modeling for Wireless Communications, BER Performance Improvement with diversity, Types of Diversity – Frequency, Time, Space.

BROADBAND WIRELESS CHANNEL MODELING:

WSSUS Channel Modeling, RMS Delay Spread, Doppler Fading, Jakes Model, Autocorrelation, Jakes Spectrum, Impact of Doppler Fading.

UNIT-II

CELLULAR COMMUNICATIONS:

Introduction to Cellular Communications, Frequency reuse, Multiple Access Technologies, Cellular Processes - Call Setup, Handover etc., Teletraffic Theory.

UNIT-III

CDMA:

Introduction to CDMA, Walsh codes, Variable tree OVSF, PN Sequences, Multipath diversity, RAKE Receiver, CDMA Receiver Synchronization.

OFDM:
Introduction to OFDM, Multicarrier Modulation and Cyclic Prefix, Channel model and SNR performance, OFDM Issues – PAPRFrequency and Timing Offset Issues.

UNIT-IV
MIMO:
Introduction to MIMO, MIMO Channel Capacity, SVD and Eigen modes of the MIMO Channel, MIMO Spatial Multiplexing – BLAST, MIMO Diversity – Alamouti, OSTBC, MRT, MIMO - OFDM.

UNIT-V
UWB (ULTRAWIDE BAND):
UWB Definition and Features, UWB Wireless Channels, UWB Data Modulation, Uniform Pulse Train, Bit-Error Rate Performance of UWB.
3G AND 4G WIRELESS STANDARDS
GSM, GPRS, WCDMA, LTE, WiMAX.

TEXT BOOKS:
[1] Theodore Rappaport, "*Wireless Communications: Principles and Practice*", Prentice Hall, 2009.

[2] EzioBiglieri, "*MIMO Wireless Communications*" Cambridge University Press, 2007

REFERENCES:
[1] David Tse and PramodViswanath, "*Fundamentals of Wireless Communications*", Publisher - Cambridge University Press, 2005.

[2] Andrea Goldsmith, "*Wireless Communications*" Cambridge University Press, 2004.

[3] ArogyaswamiPaulraj, "*Introduction to Space-Time Wireless Communications*", Cambridge University Press, 2003.

[4] John G Proakis, "*Digital Communications*" McGraw Hill, 5 Ed., 2008.