# NIRMA UNIVERSITY
## SCHOOL OF TECHNOLOGY, INSTITUTE OF TECHNOLOGY
### B.Tech. Electronics & Communication Engineering
### Semester - VI
### <u>Department Elective III</u>

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| Course Code | 2ECDE57 |
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| Course Title | Wireless Communication |

**Course Outcomes (COs)**:

At the end of the course, the students will be able to
1. Characterize and model wireless channels.
2. Evaluate Bit Error Rate (BER) and outage performance of MIMO wireless Communication systems with diversity techniques using mathematical analysis and simulations.
3. Analyze the performance of wireless systems using outage probability and channel capacity for MIMO systems with spatial multiplexing.
4. Comprehend GSM and CDMA based cellular standards.

**Syllabus:**                                                                    **Teaching Hours:45**

**UNIT 1: Mobile Radio Propagation and Cellular Concepts**                         **05**
Large scale effects, small scale effects, multipath effect and Doppler effect, channel models, the capacity of a wireless channel, an overview of a cellular communication network.

**UNIT II: Diversity Techniques**
Time, frequency and space diversity, receive, transmit and transmit-receive diversity, MIMO systems, Multicarrier Modulation using OFDM. Coherent and non-coherent detections. Derivation of BER, outage probability in Rayleigh fading channels.                  **12**

**UNIT III: Spatial Multiplexing**
VBLAST architecture, SVD based spatial multiplexing, the channel capacity of MIMO wireless systems, the performance of MIMO systems with imperfect CSI and spatial correlation.                                                                         **12**

**UNIT IV: GSM Standard**
Multiple access schemes TDMA and FDMA, logical and physical channels, call initiation and termination, source coding and channel coding, frame structure, interference reduction techniques,                                                                        **08**

**UNIT V: CDMA based Standard**
Overview of spread spectrum, multiple access scheme CDMA, DSSS and FHSS, rake receiver, channel structure, MLSRF and Long-short PN code generation, Walsh code, uplink and downlink communication, CDMA Standards.                                           **08**

**Self-Study:**
The self-study content will be declared at the commencement of the semester. Around 10% of the questions will be asked from self-study content.

**Laboratory Work:**
Laboratory work will be based on the above syllabus with minimum of 10 experiments to be incorporated.

**Suggested Readings**:
1. T. S. Rappaport, Wireless Communications, Principles and Practices, Pearson Education India
2. A.Goldsmith, Wireless Communication, Cambridge press
3. D. Tse and P. Viswanath, Wireless Communication, Cambridge Press
4. T. L. Singal, Wireless Communication, Tata McGraw Hill
5. K. Feher, Wireless Digital Communication, PHI