

SEMESTER <i>Eighth</i>	DEPARTMENT <i>Telecommunications Engineering</i>	COURSE TITLE <i>Wireless Communications</i>
COURSE CODE <i>ET805</i>	HOURS 3 UNITS 3	COURSE SPECIFICATIONS <i>Theoretical Content</i>

1. Performance Limits of Multiple-Input Multiple-Output Wireless Communication Systems:

- MIMO System Model.
- MIMO System Capacity Derivation.
- MIMO Channel Capacity Derivation for Adaptive Transmit Power Allocation.
- MIMO Capacity Examples for Channels with Fixed Coefficients.
- Capacity of MIMO Systems with Random Channel Coefficients.
- Effect of System Parameters and Antenna Correlation on the Capacity of MIMO Channels.

2. Space-Time Coding Performance Analysis and Code Design:

- Fading Channel Models.
- Diversity.
- Space-Time Coded Systems.
- Performance Analysis of Space-Time Codes.
- Space-Time Code Design Criteria.
- Exact Evaluation of Code Performance.

3. Space-Time Block Codes:

- Alamouti Space-Time Code.
- Space-Time Block Codes (STBC).
- STBC for Real Signal Constellations.
- STBC for Complex Signal Constellations.
- Decoding of STBC.
- Performance of STBC.
- Effect of Imperfect Channel Estimation on Performance.
- Effect of Antenna Correlation on Performance.

4. Space-Time Trellis Codes:

- Encoder Structure for STTC.
- Design of Space-Time Trellis Codes on Slow Fading Channels.
- Performance Evaluation on Slow Fading Channels.
- Design of Space-Time Trellis Codes on Fast Fading Channels.
- Performance Evaluation on Fast Fading Channels.

5. Space-Time Turbo Trellis Codes:

- Performance of Recursive STTC.
- Space-Time Turbo Trellis Codes.
- Decoding Algorithm.
- ST Turbo TC Performance.

6. Layered Space-Time Codes:

- LST Transmitters.
- LST Receivers.
- Comparison of Various LST Architectures.

7. Differential Space-Time Block Codes:

- Differential Coding for a Single Transmit Antenna.
- Differential STBC for Two Transmit Antennas.
- Differential STBC with Real Signal Constellations for Three.
- Differential STBC with Complex Signal Constellations for Three.
- Unitary Space-Time Modulation.
- Unitary Group Codes.

8. Space-Time Coding for Wideband Systems:

- Performance of Space-Time Coding on Frequency-Selective.
- STC in Wideband OFDM Systems.
- Capacity of STC-OFDM Systems.
- Performance Analysis of STC-OFDM Systems.
- Performance Evaluation of STC-OFDM Systems.
- Performance of Concatenated Space-Time Codes over OFDM Systems.
- Transmit Diversity Schemes in CDMA Systems.
- Space-Time Coding for CDMA Systems.
- Performance of STTC in CDMA Systems.
- Performance of Layered STC in CDMA Systems.

References:

1. *Space-Time Coding* by Branks Vucetic, Jinhong Yuan, 2003.