

EC 523M Advanced Communication Systems

COURSE INFORMATION

| Prerequisites | Academic Year & Level | | Teaching Methods | | | Credit Hrs. |
|---------------|-----------------------|----------|------------------|----------|------------|-------------|
| | Year | Semester | Lecture | Tutorial | Laboratory | |
| EC 422 | 5 | 9 | 2 | 2 | 2 | 3 |

COURSE AIM

To get the students familiar with the spread spectrum multiple access techniques (FDMA, TDMA and CDMA techniques) and its applications. Also, to get familiar with multi-carrier techniques. Source and channel coding techniques.

COURSE WEEKLY CONTENTS

- Week Number 1:* Concept of information theory – Entropy - Concept of source coding techniques.
- Week Number 2:* Channel Capacity (Shannon Theory).
- Week Number 3:* FDM and FDMA techniques, performance and capacity- FDM Systems
- Week Number 4:* TDM and TDMA techniques, performance and capacity- TDM Systems
- Week Number 5:* Spread Spectrum Techniques
- Week Number 6:* Spreading Codes- M-Sequences- Gold Codes
- Week Number 7:* CDM and CDMA techniques, performance and capacity
- Week Number 8:* Examples of CDMA Communication Systems- 3G Mobile Systems
- Week Number 9:* Signal Propagation and Path Loss Models, with emphasis on Multipath fading channel
- Week Number 10:* Rayleigh fading channel (Flat and frequency selective fading), Coherence bandwidth RMS delay spread - Coherence time – Doppler frequency.
- Week Number 11:* Multicarrier modulation, OFDM and OFDMA Techniques.
- Week Number 12:* Channel Coding techniques: Linear Block Codes - Convolutional Codes.
- Week Number 13:* Viterbi decoding (Decoders)- Introduction to Turbo and LDPC Codes
- Week Number 14:* Overview of receiver diversity (System model, selection combining, threshold combining, equal gain combining, and maximal ratio combining).
- Week Number 15:* 4G Systems (LTE-WiMax)
- Week Number 16:* Final Exam

STUDENT GRADING & ASSESSMENT

| Weeks | Exams | Assign. | Quizzes | Reports | Present. | Lab. | Total |
|-----------------|-------------------|----------------|---|----------------|-----------------|-------------|------------|
| 1 to 7 | 20 Midterm | ← | 10 | MARKS | | → | 30 |
| | | | To be freely distributed among possible assessments | | | | |
| 8 to 12 | | ← | 20 | MARKS | | → | 20 |
| 13 to 15 | | ← | 10 | MARKS | | → | 10 |
| 16 or 17 | 40 Final | | | | | | 40 |
| Total | Exams | Assign. | Quizzes | Reports | Present. | Lab. | 100 |

REFERENCES

- | | |
|-----------------|---|
| Textbook | <ul style="list-style-type: none"> • Don Torrieri "Principles of Spread-Spectrum Communication Systems", Springer |
| Other | <ul style="list-style-type: none"> • Wozinraft and jacob, "Principles of communication Engineering" • Martin S. Roden, "Digital and data communication systems". • Micha Schwartz, "Information transmission, modulation and noise". |