

EE 413 - Wireless Communications

Fall 2022

- Course Objectives:** To introduce students with the fundamentals and design principles of wireless communication systems from the physical layer perspective.
- Instructor:** Prof. Özgür Gürbüz
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- Class Hours:** Monday, 14:40-16:30, FENS L067
Wednesday 13:40-14:30, FENS L062
- Course Text:** *Wireless Communications*, Andrea Goldsmith, Cambridge University Press, 2005.
- Additional Reading:** *Wireless Communications, Principles and Practice*, Theodore S. Rappaport, 2nd Edition, Prentice Hall, 2002
Digital Communications, John G. Proakis, McGraw-Hill, 4th Edition, 2000.
- Grading:**
(Tentative)
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| Midterm | 30% |
| Final | 30% |
| Project | 30% |
| Homework | 10% |
- Prerequisites:** Background in probability theory and communication theory is required. Knowledge of programming languages Matlab and/or Python is required for projects.
- Notes:** Project will include simulation and design of a wireless communication system/algorithm and performance analysis of the system. Each student is expected to spend the necessary amount of time on each project and each student is expected to submit his/her own work.
- There will be only one make up test for students who have missed the midterm or the final. The make up will take place after the final examination and it will address all topics covered in the course.
- Course Contents:**
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| Overview of Wireless Communications | (Ch 1) |
| Path Loss and Shadowing | (Ch 2) |
| Statistical Multipath Channel Models | (Ch 3) |
| Capacity of Wireless Channels | (Ch 4) |
| Digital Modulation and Detection | (Ch 5) |
| Performance of Digital Modulation over Wireless Channels | (Ch 6) |
| Diversity | (Ch 7) |
| Coding for Wireless Channels | (Ch 8) |
| Multiple Antennas and Space-Time Communications | (Ch 10) |
| Spread Spectrum | (Ch 13) |
| Multiuser Systems | (Ch 14) |
| Cellular Systems | (Ch 15) |