

EE520: Topics in Communications

-- Wireless Communications (3 Credits)

Spring 2006

Instructor:

Sang W. Kim, 3112 Coover, 294-2726, swkim@iastate.edu

Lecture Hours:

TR 1:30-2:50

Office Hours:

T 4:00-5:30

Class Room:

Howe 1242

Course Description:

This course is to provide a strong foundation for graduate study and research in the area of wireless communications. Primary topics for the course are:

- Wireless channel models
- Capacity of wireless channels
- Digital modulation in wireless channels
- Diversity
- Coding for Wireless Channels
- Spread spectrum and Rake receivers
- Code division multiple access (CDMA)
- Orthogonal frequency division multiplexing (OFDM)
- Multiple antenna and space-time communications
- Advanced topics such as multiuser detection, cooperative communications, ultra-wideband communications as time allows

As part of the course work, students are required to write a term paper on a topic relevant to wireless communications. This paper can be either a thorough literature search on a specific topic, or a study presenting an original research contribution in the field. Papers should demonstrate understanding of the material taught. More information about the project requirements is in a separate handout.

Prerequisites:

Graduate Level Probability (EE 523 or equivalent)

An undergraduate course in digital communications (EE422 or equivalent)

Textbook:

Andrea Goldsmith, *Wireless Communications*, Cambridge University Press, 2005.

References:

- D. Tse and P. Viswanath, *Fundamentals of Wireless Communication*, Cambridge University Press, 2005.
- T. S. Rappaport, *Wireless Communications - Principles and Practice*, 2nd Ed. Prentice Hall, 2001.
- S. Verdu, *Multiuser Detection*, Cambridge: 1999.
- A.J. Viterbi, *CDMA: Principles of Spread Spectrum Communication*, Addison-Wesley 1995.
- M.K. Simon, J.K. Omura, R.A. Scholtz, and B.K. Levitt, *Spread Spectrum Communications Handbook*, McGraw-Hill 1994.
- J.G. Proakis, *Digital Communications*, 4th Ed., McGraw-Hill: 2001.
- M. K. Simon and M.-S. Alouini, *Digital Communications over Fading Channels, A Unified Approach to Performance Analysis*, Wiley: 2000.

Grading:

Homework: 10%

Exam I: 30%

Exam II:30%

Project: 30%

Disability Statement:

If you have a documented disability and anticipate needing accommodations in this course, please request that a Disability Resources (DR) staff send a Student Academic Accommodation Request (SAAR) form verifying your disability and specifying the accommodations you will need. DR is located in Room 1076 of the Student Services Building.