

**ECE 559**

Handout # 1

**Fall 2007**

August 22, 2007

## **ECE 559: Wireless Communications**

**Course Web Site:** <http://ifp.uiuc.edu/vvv/ece559/>

**Prerequisite:** ECE 361 (or equivalent), ECE 534

**Class Time and Place:** Mondays, Wednesdays, 10:00am – 11:20am in 106B6 Eng Hall

**Instructor:** Prof. Venu Veeravalli, 106 CSL, Ph: 3-0144, e-mail: vvv@uiuc.edu

**TA:** TBA

**Office Hours:** Mondays 2-4 (other times by appointment – e-mail)

**TA Office Hours:** TBA

**Description:** This is a graduate course on the theory and analysis of wireless communication systems, with an emphasis on understanding the unique characteristics of these systems. Topics include: cellular principles, wireless propagation and path loss, characterization of multipath fading channels, modulation and equalization techniques for mobile radio systems, multiple access alternatives, multi-input multi-output (MIMO) system design, and capacity calculations.

**Course Text:** You are not required to buy a text for this course. Course notes and links to relevant papers will be made available on the course website on a regular basis. For those who would like to buy a book on the subject, the following book is recommended:

D. Tse and P. Viswanath, *Fundamentals of Wireless Communication*, Cambridge University Press, 2005

### **Syllabus:**

- Introduction to wireless communication systems
- Wireless channel modeling
- Capacity and fundamental limits
- Modulation, equalization and coding techniques for wireless communications
- Multiaccess and interference management
- MIMO Systems

### Additional Reading:

- ★ A. Goldsmith, *Wireless Communications*, Cambridge University Press, 2005.
- ★ J. G. Proakis, *Digital Communications*, 4th Edition, McGraw-Hill, 2001.
- ★ A. J. Viterbi, *CDMA: Principles of Spread Spectrum Communications*, Addison-Wesley, 1995
- ★ S. Verdu, *Multuser Detection*, Cambridge University Press, 1998.

All of these books have been put on reserve in the Grainger Library. Further supplemental reading material may be put on reserve during the course of the semester.

Other useful information, including all course handouts, will be available on the course web site (<http://www.ifp.uiuc.edu/~vvv/ece559/>)

### Exams and Grading:

Home-work	20%
Take-Home Exam	30%
Project Presentation	25%
Project Report	25%

Homework problems will be assigned roughly every 10 days. Late material will not be accepted unless prior arrangements are approved by me at least 24 hours in advance of the due date/time.

The take-home exam will be given around the end of October.

The project for the course will consist of an oral presentation and a written report. Detailed guidelines for the project will be available on the web site soon.

### Background and Prerequisites:

The prerequisites for this course include ECE 361, or an equivalent undergraduate course on digital communications, and ECE 534, the graduate-level course on probability and stochastic processes. Basic knowledge of matrix analysis is also expected.