ECE 371VV **Spring 2001**

Handout # 1 January 16, 2001

ECE 371VV: WIRELESSS COMMUNICATION NETWORKS

Course Web Site: http://www.comm.csl.uiuc.edu/∼vvv/ece371/

Prerequisite: ECE 359 (with strong backround in probability at level of ECE 313)

Suggested Corequisite: ECE 361 or ECE 338

Class Time and Place: 170 Everitt, TuTh 10:00–11:20

Instructor: Prof. Venu Veeravalli, 128 CSRL, Ph: 3-0144, e-mail: vvv@uiuc.edu

TA: K. Chaitanya Reddy, 108 CSRL, Ph: 3-2148, e-mail: kreddy@uiuc.edu

Office Hours: TBA

TA Office Hours: TBA

Course Text: (recommended, but not required) T. S. Rappaport, *Wireless Communications: Principles and Practice*, Prentice Hall, 1996.

Syllabus:

- Introduction to Wireless Communication Networks (1 lecture)
- The Cellular Concept – channelized Systems (FDMA, TDMA), frequency reuse, trunking efficiency and Grade of Service (GoS), Erlang capacity, use of guard channels for prioritization (3 lectures)
- Channel Characterization – Large scale variation (path loss and shadow fading) models; Small scale variation models, Rayleigh and Ricean fading, coherence time, coherence bandwith, frequency flat and selective fading (4 lectures)
- Basic Applications of Large Variation Models – Coverage and area reliability for channelized systems, SIR with fading and reuse efficiency, Channel prediction for radio resource management (2 lectures)
- Code Division Multiple Access (CDMA) – Erlang capacity and coverage of CDMA (2 lectures)
- Radio Resource Management – design and analysis of handoff, power/rate control, and channel assignment algorithms (5 lectures)
- Random Multiaccess Techniques – contention protocols, capture effect, reservation protocols, scheduling based on channel state (3 lectures)
- Mobility Management – handoff, roaming, mobile IP (2 lectures)
- Routing and Transport – routing, TCP over wireless, wireless ATM (3 lectures)
- Project Presentations (3 lectures)

Additional Reading:

- ⋆ Haykin, Simon; *Communication Systems 3rd Ed.*
- ⋆ G. L. Stuber, *Principles of Mobile Communication.*
- ⋆ Proakis, John G.; *Communication Systems Engineering.*
- ⋆ Goodman, David J. (Ed.); *Wireless and Mobile Communications.*
- ⋆ Goodman, David J. (Ed.); *Wireless Communications.*
- ⋆ Jakes, William; *Microwave Mobile Communications.*
- ⋆ A. J. Viterbi, *CDMA: Principles of Spread Spectrum Communications.*
- ⋆ Lee, William C.Y.; *Mobile Cellular Telecommunications: Analog and Digital.*
- ⋆ Pahlavan, K. and Levesque, A. H.; *Wireless Information Networks.*
- ⋆ Rappaport, Theodore S.; *Wireless Personal Communication.*

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 of the course handouts, will be available on the course web site (http://www.comm.csl.uiuc.edu/∼vvv/ece371/).

Exams and Grading:

Class participation	5%
Home-work	20%
Midterm Exam	20%
Final	35%
Project	20%

Class participation will be evaluated based on attendance, questions that you ask in class, after class or via e-mail.

Homework problems will be assigned roughly every 10 days. Late material will not be accepted unless prior arrangements are made with me at least 1 day in advance.

The Midterm exam will be held in the middle of March.

The project will be a team project with 3-4 students per team, each exploring the details of a specific commercial wireless system or standard. Guidelines for the project will be available on the web site soon.

Background and Prerequisites:

The prerequisite for this course is ECE 359 or an equivalent undergraduate course on communications systems. It is expected that students in this class have a good background in probability at the level of ECE 313.