Purdue University
School of Electrical and Computer Engineering
ECE695N

Title: Wireless Communication Networks
Graduate Areas: Communications, Networking, Signal & Image Processing
Number of Credits: 3
Time and Room: T Th 10:30-11:45am, EE226
Webpage: http://engineering.purdue.edu/~ee695n

Instructor: Xiaojun Lin,
Email: linx@ecn.purdue.edu
Office: MSEE340
Office Hour: T 9:30-10:20am, or by appointment

Recommended Background:

ECE547 or consent of instructor. Students are expected to enter the course with an introductory graduate-level understanding of networking, as well as a basic understanding of probability obtained from a typical undergraduate EE program.

If you have not taken ECE 547, you should look at its lecture notes available on the web (http://engineering.purdue.edu/~ee547). You will need knowledge of Poisson process and Markov Chain analysis, which correspond to lectures up to Lecture 17. Please email me for a password to access the lecture notes.

Course Description:

This course will cover fundamental concepts in mobile wireless systems such as propagation and fading, cellular systems, channel assignment, power control, handoff, mobility management. It will also cover system and standards issues including 2G circuit switched and 3G/4G packet switched networks, wireless LANs and ad hoc networks. Besides providing and overviewing current technologies, the emphasis on the course will be to identify the challenges that face the engineering of wireless communications networks.

Course Objectives:

Students should leave the course with a fundamental understanding of the principles of wireless communications. This ranges from a basic understanding of the physical channel that these networks operate over, to network design, control, and protocol issues. They should have a familiarity with the state-of-the art technologies and key challenges that need to be addressed if high-quality multimedia applications are to be run on wireless channels.
Text:

2. Related papers.

Grades:

Homework: 25%
Midterm Exam (1): 30%
  - Tue 04/03, Evening. Time and place TBA
Projects: One assigned project (15%) and one final project selected by the student (30%)

Course Outline

Week 1: Historic Milestones and Current Wireless Networks
Week 2: Understanding the Wireless Communication Channel
Week 3: Wireless LANs (802.11 and Bluetooth)
Week 4: Random Access and DCF Modeling
Week 5: Optimal Scheduling in Ad Hoc Networks
Week 6: Routing and Cross-Layer Design
Week 7: Scaling Laws
Week 8: Concept of Cellular Communications, Handoff, and Location Management
Week 9-10: Channel Allocation Techniques
Week 11: Modulation and Multiple Access Techniques (FDMA, TDMA, CDMA)
Week 12: Power Control for CDMA networks
Week 13: System Case Studies, (e.g. GSM and IS-95)