ECEN 621-600: Mobile Wireless Networking, Spring 2009

A Course Targeting at State-of-The-Art Knowledge In Advanced Wireless Communications and Networking Design & Analysis Techniques

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CLASS Time/Room: Tue & Thur: 05:30PM-06:45PM ZACH 104D

COURSE DESCRIPTION:

This graduate course provides an in-depth study of principles, architectures, protocols, and modeling techniques for mobile wireless networks. The course aims at equipping graduate students with not only a solid foundation and the state-of-the-art knowledge in a wide spectrum of wireless communications techniques and protocols, but also the rigorous analytical capabilities to evaluate the performance of complex mobile wireless systems and networks. As a research-oriented class, this course will also introduce students to the emerging and hot topics in mobile wireless networking and mobile computing research.

The course will start with an introduction of the fundamental architectures and principles of mobile and wireless networks and their relationships with the backbone Internet. The focus will then move on to the main wireless communication theories and modeling techniques used in mobile wireless networks. This is followed by the detailed examinations of a number of most recently developed mobile wireless networking technologies and architectures. Several types of widely employed mobile wireless networks and research topics are investigated in-depth as the further applications of the newly developed wireless networking techniques.

The course material consists primarily of the classic and recent technical papers published on major wireless/wired networking journal and conferences and the referenced (recommended, but not required) text books.

The course also aims at introducing new graduate students to research, as well as exploit potential topics for MS comprehensive projects and PhD research directions.

PREREQUISITE: Graduate standing and this is basically a content self-contained class or consent of the instructor. An introduction-level class on "Computer Networks" and basic C++ programming may help.

Textbook: Classic and Recent selected research papers and the referenced (recommended but not required) text books are as follows: (1) T. Rappaport: "Wireless Communications Principle & Practice" Prentice Hall, 2004, (2) Gordon L. Stüber: "Principles of Mobile Communication", Kluwer Academic Publishers, 2001.

Grading (Tentative): Assignments: 20%; Projects: 40%; Exams: 40%.

Course Outline (Tentative):

Fundamental architectures of mobile and wireless networks
Mobile networking over Internet through wireless accessing
TCP/IP protocols over wireless links
Antennas/propagation and multi-path fading channel modeling
Spread Spectrum, CDMA, MC-DS-CDMA, OFDM, and MIMO
Error resilience, channel coding, and LDPC codes
Cross-layer design and optimization
Satellite networks and cellular wireless networks
Wireless Local Area Networks (WLANs) and multiple access
IEEE 802.11 WLANs standards and protocols
Adapting IEEE 802.11 to multimedia and QoS supported WLANs
Mobile multicast streamings over WLANs
Mobile IP and wireless access protocols
Mobile Ad Hoc networks and wireless sensor networks
Wireless network security