

ELEN E6951 - Wireless & Mobile Networking, II

Lecturer:

Prof. Gil Zussman

Office hours: Mon. 1:15pm-3:15pm

Office: 811 Schapiro

Phone: (212) 854-8670

Email: gil at ee dot columbia dot edu

URL: <http://www.ee.columbia.edu/~gil>

TA/Grader: Shuzo Tarumi, 812 Schapiro, Shuzo.Tarumi@lsi.com.

Credits: 3

Day, time and place: Mon. 11:00am – 1:00pm, Room: S. W. Mudd 644

Prerequisites: Basic knowledge of computer networks, algorithm design, and probability is expected. Wireless & Mobile Networking, I (ELEN E6950) **is not a prerequisite.**

Description: The course will cover various topics in the area of wireless and mobile networking. It will mostly focus on functionalities that are included in the layers **above** the physical layer. The objective is to understand the latest wireless network design challenges, protocols, and proposed algorithms. The topics include:

- Wireless communications basics (brief review).
- MAC protocols (e.g. TDMA, Aloha, CSMA/CA).
- Recent standards (e.g. IEEE 802.11, Bluetooth/IEEE 802.15, IEEE 802.16).
- Wireless networking concepts (ad hoc networks, wireless mesh networks, sensor networks, vehicular networks, cognitive radio networks, etc.).
- Routing protocols.
- Transport protocols (TCP over wireless, flow and congestion control in wireless).
- Energy Management.
- Localization.
- Time synchronization.
- Cross layer design (joint routing, scheduling, channel allocation, etc.).
- Fundamental limitations (capacity, connectivity, etc.).
- Mobility models and mobility control.

The course will be research oriented. In the first part, basic topics will be presented by the lecturer. In the second part, topics which are related to ongoing research efforts will be presented by students. The students will also work on a project related to ongoing research (preferably related to the topic they presented). The project can be purely theoretical, simulation based, or implementation based.

Required text: The textbook is

- Jochen H. Schiller, Mobile Communications, Addison Wesley, 2005.

The textbook will be supplemented by research papers (a list will be provided). In addition, parts of the following textbooks are relevant as recommended reading:

- Charles E. Perkins, Ad hoc Networking, Addison Wesley, 2000.
- Holger Karl and Andreas Willig, Protocols and Architectures for Wireless Sensor Networks, Wiley, 2005.

Grading: homework (15%), midterm (35%), class presentation + final project (50%).