

Wireless Networks

Spring 2016

Course Description:

Introductory course in mobile, cellular and wireless networks providing fundamental techniques in architecture, operation and security of second, third, and fourth generation wireless networks. The evolution of wireless networks will be discussed covering infrastructure components, protocols, logical channels, security, and registration procedures. Starting with the technical background, we will cover transmission fundamentals, communication networks, and protocol and TCP/IP Suite. The technologies used will be covered next resulting in the ability to describe the wireless channel, signal encoding, orthogonal frequency division multiplexing, spread spectrum, and coding and error control. The evolution into wireless local and personal area networks covering IEEE 802.11 and 802.15 standards will be covered in order to discuss some of the biggest technology trends and threat areas, the smart home. Wireless network and applications will be covered near the end of the course allowing discovery and discussion of fourth generation systems and long term evolution. Smart phone technologies, embedded operating systems, location-based services and security throughout all components of mobile technologies will be covered. Pros and cons of security will be discussed and alternate solutions will be theorized.

Prerequisites: Computer Networks

Course Instructor: William Bengtson, <email>

Office Hours: TBA

Course URL: TBA

Course Schedule: Wednesdays

Course Text:

- Cory Beard, William Stallings: Wireless Communication Networks and Systems
- Supplementary and online technical articles to be provided during the semester

Course Hardware:

- <http://hakshop.myshopify.com/collections/wireless-gear/products/software-defined-radio-mobile-kit>

Grading Policy:

- Homework: 30%
- Exams: 70%

Homework Assignments:

There will be at least eight homework assignments throughout the semester. Homework will be assigned on Wednesdays and due one to two weeks from assignment. Assignments may require computer use.

Exams:

- Exam #1: 35%
- Exam #2: 35%

Grading Rules:

- Both homework and exams are essential for the final grade
- All students will be required to take both exams. If you cannot take the exams when scheduled due to a legitimate reason, the exam can be scheduled to be made up at an earlier or later date.
- Students may miss up to two homework assignments due to legitimate reasons. The remaining homework assignments comprise the entire homework score.
- See the course website for what constitutes a legitimate reason.
- Late assignments will not be accepted.
- Individual work only is allowed on homework sets and exams.

Reading Assignments:

Readings will be posted weekly and must be complete prior to class. Reading assignments will be posted Wednesday evenings to be completed prior to class the following week. The source of reading assignments is the course text book unless otherwise described.

Tentative Syllabus:

- Technical Background
 - Transmission Fundamentals
 - Protocols
 - Networks
- Wireless Communication Technology
 - Overview
 - Generations of Cellular
 - Wireless Channel
 - Signal Encoding
 - Orthogonal Frequency Division Multiplexing
 - Error Control

- Wireless Local and Personal Area Networks
 - Wireless LAN - 802.11
 - Bluetooth
 - Zigbee - 802.15.4
- Wireless Mobile Networks and Applications
 - Cellular Wireless Networks
 - Fourth Generation Systems
 - Mobile Applications and IP
 - Long-Range Communications
- Security in Wireless Technologies
 - Securing Data Transmissions
 - Backwards Compatibility
 - Authentication
- Traffic Analysis