CPE 748 Mobile and Wireless Networks

TR 12:45-2:05 p.m., spring 2010, EB 219

(subject to change)

Instructor: Dr. Seong-Moo (Sam) Yoo
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Office Hours: TR 11:00 a.m.-12:15 p.m., and by appointment

Class Description: This course covers high-level issues in mobile and wireless networks. The main topics are mobile IP, mobile ad hoc networks (MANETs), wireless sensor networks, wireless LAN, Bluetooth, cellular networks, satellite systems, and security issues in mobiles and wireless networks. Students are requested to write a research paper as a term project. This course is a highly research-oriented class. Students will make presentations on research papers and his/her own term paper.

Required Textbook:

Mobile Communications, Second Edition, Jochen Schiller, Addison-Wesley, ISBN: 0-321-12381-6

Reference:

1. Wireless Communications and Networks, William Stallings, Prentice Hall, 2002
2. Security and Cooperation in Wireless Networks, Levente Buttyan and Jean-Pierre Hubaux, Version 1.5.1 online (http://secowinet.epfl.ch).
3. Research papers (IEEE/ACM/…)

Prerequisite: CPE 648 Advanced Computer Networks, CS 670 Computer Networks, or instructor's permission

Grading: Two midterm exams (each 20%, total 40%), term paper (40%), pop quiz, presentations and class participation (20%).

Topics:

1. Mobile IP:
   IP packet delivery, agent discovery, registration, tunneling and encapsulation, optimizations, reverse tunneling, IPv6.
2. Medium access control in wireless networks
   Hidden and exposed terminals, near and far terminals, SDMA, FDMA, TDMA, CDMA.
3. Ad hoc networks (MANETs)
   Routing, destination sequence distance vector routing, dynamic source routing, alternative metrics vector routing, ad hoc on-demand distance vector routing, hybrid routing.
4. Wireless sensor networks
   Fundamentals of MAC protocols, various routing schemes, energy efficient routings.
5. Wireless LAN (IEEE 802.11)
   System architecture, protocol architecture, physical layer, MAC layer, MAC management, newer developments.
6. Personal area networks
   Bluetooth
   Architecture, radio layer, baseband layer, link manager protocol, security issues.
7. Cellular networks
   Principles of cellular networks, 1G analog system, 2G TDMA system, 2G CDMA system, 3G systems, GSM, IS-95.
8. Satellite systems
   Applications, GEO, LEO, MEO, routing, localization, handover.
9. Security in Wireless Networks
   Security in MANETs, security in WLAN, ...
10. Others.

Tentative course schedule

(Subject to change)

Week	Date	Covered material	Remark
1	1/12, 1/14	Introduction, Network protocol/Mobile IP	
2	1/19, 1/21	Network protocol/Mobile IP	
3	1/26, 1/28	Ad hoc networks	
4	2/2, 2/4	Ad hoc networks	
5	2/9, 2/11	Wireless transmission, Medium access control	
6	2/16, 2/18	Medium access control	
7	2/23, 2/25	Wireless LAN	
8	3/2, 3/4	Wireless LAN	3/4 Exam 1
9	3/9, 3/11	Cellular systems	
10	3/16, 3/18	No class	3/15~3/20 Spring break
11	3/23, 3/25	Cellular systems	
12	3/30, 4/1	Bluetooth, Wireless sensor networks	
13	4/6, 4/8	Satellite systems	4/6 Honors Day, no class
14	4/13, 4/15	Security issues	4/15 Exam 2
15	4/20, 4/22	Term paper presentations	
16	4/27	Term paper demonstrations	4/27 last class
	4/29	Term paper (written report) due	No final exam

Term Paper

To be announced later.