

CMPE 542 Advanced Networking (Fall 2008)

Instructor:	Asst. Prof. Dr. Doğu Arifler
Course Web Site:	http://cmpe.emu.edu.tr/courses/cmpe542
Office Hours:	TBA. Please refer to the course Web site.
Textbook:	A. Leon-Garcia and I. Widjaja, <i>Communication Networks: Fundamental Concepts and Key Architectures</i> , 2nd ed., McGraw Hill, 2006.
Supplementary Texts:	L. L. Peterson and B. S. Davie, <i>Computer Networks: A Systems Approach</i> , 4th ed., Morgan Kaufmann, 2007. J.F. Kurose and K. W. Ross, <i>Computer Networking: A Top-Down Approach</i> , 4th ed., Addison Wesley, 2008. B. Krishnamachari, <i>Networking Wireless Sensors</i> , Cambridge University Press, 2006.
Prerequisite:	No official prerequisite. However, you must have a strong background in undergraduate-level engineering mathematics and communication networks.

Catalog Description: Layered network systems, cross-layer design, design trade-offs; modeling network traffic, fluid models of network traffic, models for data, voice, and video traffic; access control: leaky buckets; flow and congestion control and models; broadband wireless, design challenges, recent trends and models; embedded network systems: deployment, data dissemination, coverage, and connectivity.

Related Courses: You may also consider taking *CMPE 547 Queueing Networks for Computer Applications*, *CMPE 548 Analysis of Computer Communication Networks*, and *CMPE 549 Wireless Personal Communications* in conjunction/in the sequel.

Important Dates: Midterms: 28 Nov–6 Dec 2008, Finals: Jan 26–Feb 10, 2009.

Grading Policy: Midterm 30%, Final 40%, Presentations 30%

Presentations: Each student will give two brief presentations based on two papers that will be assigned by the instructor from a paper list which will be available from the course Web site. All students are responsible for the material covered in the papers.

Make-Up Policy: Only one **comprehensive** make-up examination will be given to those who miss any of the midterm or the final. The make-up exam will be given to only those who provide a valid excuse in writing within the next three working days following the missed exam. This rule is a University by-law, and I **will** enforce it. Students who miss an exam due to a serious medical condition are required to provide official documentation (doctor's report approved by the Student Health Center). However, eligibility to take the make-up exam will still be **subject to my approval**.

Academic Dishonesty: Any conduct that attempts to gain unfair academic advantage is considered academic dishonesty. Copying assignments, cheating during exams, substituting for another person are some examples of academic dishonesty. Cases of academic dishonesty **will not** be tolerated and will be punished according to EMU's disciplinary policies.

Tentative outline: Below is a tentative outline for this course. I reserve the right to adjust the pace and topics of the class as the semester progresses.

Week 1	Overview of general networking concepts
Week 2	Layered network systems; cross-layer design
Week 3	Circuit-switching, control of telephone networks
Week 4	Reliable transmission: ARQ protocols and efficiency analysis
Week 5	Packet switching, link sharing using packet multiplexers; models for bursty traffic
Week 6	Medium access control; performance analysis
Week 7	Flow and congestion control; AIMD congestion control; models
Week 8	Network access control; leaky buckets
Week 9	Midterm week
Week 10	Broadband wireless; recent trends and models
Week 11	Cross-layer design revisited for wireless networks; channel-aware scheduling
Week 12	Embedded networking; overview of sensor networks, challenges
Week 13	Topology control, data dissemination, coverage, connectivity in sensor networks
Week 14	Review and concluding remarks

Suggested Reading from Leon-Garcia and Widjaja:

- **Week 1:** §1.1-1.3, 2.2-2.3, 3.1-3.9
- **Week 2:** §2.2-2.3
- **Week 3:** §4.1, 4.7
- **Week 4:** §5.1-5.3, 5A
- **Week 5:** §5.7
- **Week 6:** §6.1-6.5
- **Week 7:** Handout on AIMD
- **Week 8:** §7.7-7.9
- **Weeks 10-11:** §4.8, 6.10, handout on wireless scheduling
- **Weeks 12-13:** Handout on sensor networks

Suggested Reading from the Supplementary Texts:

- Peterson and Davie: Chapters 1, 2, and 6
- Kurose and Ross: §1.1-1.8, 3.2, 3.4-3.7, 5.1, 5.3, 5.5, 6.1-6.4, 7.5