Northwestern University

Department of Electrical Engineering and Computer Science

EECS 454: Advanced Communication Networks Spring 2013

Information Sheet:

Instructors:

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Time and Place:

TuTh 12:30-1:50 pm in Technological Institute Rm. M166

Prerequisites:

- ***Good understanding of basic probability (e.g. EECS 302, or other undergraduate probability course).***
- An introductory course in communication networks (E.g. EECS 333 or EECS340) is helpful but not necessary.

Text:

No required textbooks. Our primary references will be hand-outs and the following three on-line sources:

- D. Bertsekas and R. Gallager, *Data Networks* (2nd Ed.), Prentice Hall, 1992. Available at: http://web.mit.edu/dimitrib/www/datanets.html
- B. Hajek, *Course Notes ECE 567:Communication Network Analysis*. Available at http://www.ifp.illinois.edu/~hajek/Papers/networkanalysis.html
- R. Srikant and L. Ying, *Communication Networks: An Optimization, Control and Stochastic Networks Perspective*, Available at: http://www.ifp.illinois.edu/~srikant/book.pdf

Course Overview:

The goal of this class is to develop understanding of some fundamental techniques used to model and analyze communication networks. Compared to EECS 333 or 340, the emphasis in this course will be more on developing analytical tools and conceptual models and less on describing the protocols used in current networks. However, some descriptions of current networks will be used to illustrate the concepts. These analytical tools are used to analyze the performance of various networks. More importantly, understanding this material can help one to develop intuition about some of the important issues in networking and provide the background needed to do research in this field. The focus of the course will be on issues commonly identified with the MAC layer, network layer, and transport layer in a network; application layer and physical layer issues will not be addressed.

Course Handouts:

Handouts not picked up during class and other announcements will be available on the course web site at http://www.ece.northwestern.edu/~rberry/ECE454/

Course Grade:

Your final grade in the course is based upon our best assessment of your understanding of the material. The weightings used to determine the final grade are:

Mid-terms(2)	50%
Scribing	10%
Final Project	20%
Problem Sets	20%

Midterm Exams:

There will be a one in-class midterm exam around the 5th week of the quarter. There will also be a take home mid-term assigned during the last week of classes.

Scribing: Each student is responsible for scribing notes for 1-2 lectures during the quarter. The notes should be written in LaTeX using the provided template. The write-up should try to fill in any details skimmed over in lecture and provide proper references. The scribed notes for Tuesday lectures are due by 5pm the following Friday, the scribed notes of Thursday's lectures are due by 5pm the following Sunday. After they are submitted we will make the scribed notes available to the entire class.

Final Project:

Part of your final grade will be based on a term paper/project that is due by June 12 at 5:00 pm. For this project, you are to read and provide a review of a current research paper on a topic related to this course. You will also be required to give a brief presentation to the class summarizing your project. Presentations will be scheduled during the last week of classes (June 3-7) or finals week (June 10-14). More details and suggested topics will be provided in another handout.

Problem Sets:

Problem sets will be assigned on a quasi-weekly schedule. In making up the midterm exams, it will be assumed that you have worked all the problems. Working together in small groups on the problem sets is encouraged; however, each person should write up their own solution to hand in. The problem sets are intended to help you learn the material and whatever maximizes learning for you is desirable. This does not include coping from previous years' solutions. Problem sets must be handed in by the end of the class in which they are due.

Syllabus (tentative):

I. Introduction
II. Flow Models – congestion control, fairness, strategic behavior.
III. Delay models – queuing theory, Markov chains.
IV. Switching – input/output queuing, stability.
V. Routing – optimal routing, combined routing and congestion control.