Networks: Technology, Economics and Social Interactions

Summer 2017
Zhiyuan College, Shanghai Jiaotong University
version 2: December 16, 2016

Instructor:

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Course Description:

This course introduces various networking technologies we use each day and the fundamental ideas behind them. Different from many "theory-based" networking courses, this course is organized around a list of intriguing questions about the technological, social, and economical aspects of modern networks. The course will broadly cover topics on wireless networks, Internet, social networks, and network economics. We will introduce various methodologies such as graph theory, optimization theory, game theory, and pricing theory.

Learning Outcome:

Upon successful completion of the course, the students will have acquired the ability to:

- Understand core concepts and fundamental methodologies of modern networks.
- Learn how to model and analyze emerging networking phenomenons.

Intended Audience and Prerequisites:

The intended audience of this course are undergraduates from Computer Science and Electronic Engineering. It is also suitable for interested undergraduate students from Control, Mathematics, and Social Science. Students are expected to have taken Advanced Engineering Math course covering multivariate calculus and linear algebra.

Textbook and References:

- M. Chiang, *Networked Life: 20 Questions and Answers*, Cambridge University Press, 2012 (main textbook, required for the course)

- J. Huang and L. Gao, *Wireless Network Pricing*, Morgan & Claypool Publisher, 2013 (reference, freely available at http://ncel.ie.cuhk.edu.hk/content/wireless-network-pricing)

- D. Easley and J. Kleinberg, *Networks, Crowds and Markets: Reasoning about a Highly Connected World*, Cambridge University, 2010 (reference, freely available at https://www.cs.cornell.edu/home/kleinber/networks-book/)

Tentative Class Schedule

The class will be 32-hour, including 3 x 8 hours of in-class lectures (completed in two weeks), 2 x 3 hours of sep-learning, and 2 hours of exam. For the in-class lectures, please arrange 3 teaching hours (3 x 45 mins) on every Mon/Tuesday/Thursday/Friday during the first two weeks of the summer semester, in the afternoon.

The chapter number refers to the textbook *Networked Life: 20 Questions and Answers*.

Week-Day	Topic
1-Monday	Chapter 1: What makes CDMA work for my SmartPhone?
1-Tuesday	Chapter 2: How does Google sell ad spaces?
1-Thursday	Chapter 3: How does Google rank webpages?
1-Friday	Chapter 4: How does Netflix recommend movies?
2-Monday	Chapter 5: When can I trust an average rating on Amazon?
2-Tuesday	Chapter 6: Why does Wikipedia even work?
2-Thursday	Chapter 7: How do I viralize a YouTube video and tip a Groupon deal?
2-Friday	Chapter 8: How do I influence people on Facebook and Twitter?
3	Chapter 11: Why does China Mobile charge me RMB60 a GB? (self-learning)
3	Chapter 12: How can I pay less for each GB? (self-learning)
4	Final Exam

Grading

Homework (50%), Final Exam (40%), Class Participation (10%).