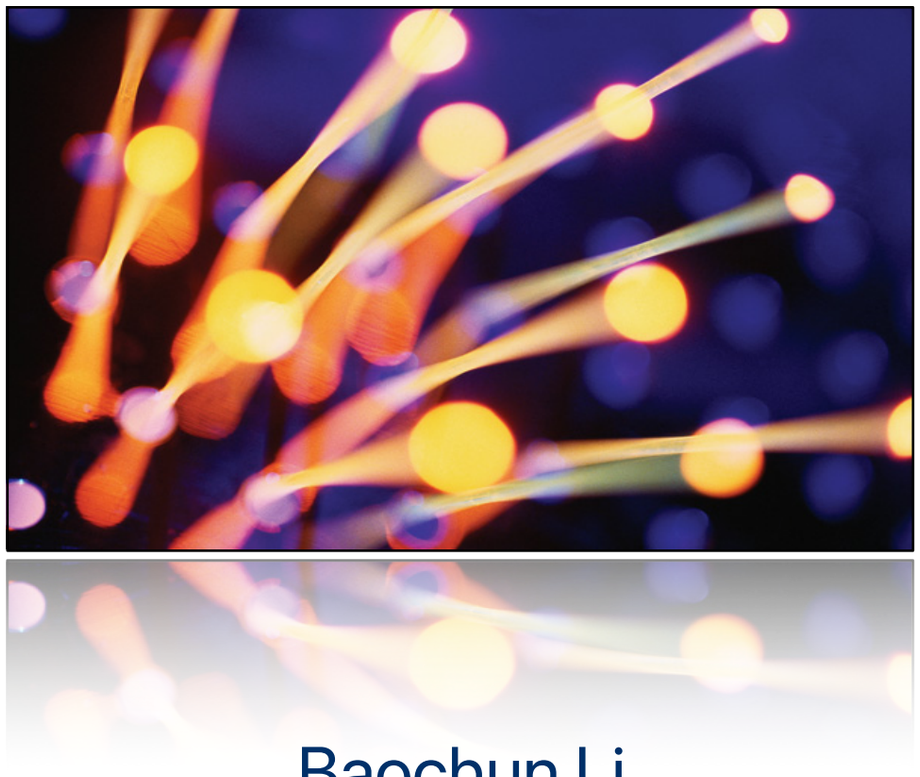
Course syllabus, schedule, lecture notes available online at

http://iqua.ece.toronto.edu/baochun/ece1771f

Grades and announcements

http://q.utoronto.ca

Episode 1. Introduction to the course



Baochun Li
Department of Electrical and Computer Engineering
University of Toronto

About me

My academic history at a glance

B.Engr. Computer Science, Tsinghua University, 1990 — 1995

M.S., Ph.D. Computer Science, Univ of Illinois, 1995 — 2000

Current: Professor, Computer Engineering Group, since 2000

Leads: iQua research group (12 students currently)

Published: quite some papers

Honours and awards: IEEE Fellow, class of 2015

15: PhD students who become faculty members

Working on: Cloud computing, federated learning, distributed machine learning

Courses I have taught

Distributed Systems, senior undergraduate course (2000-2006)

Operating Systems, senior undergraduate course (since Winter 2008)

Computer Fundamentals, first year undergraduate course (since 2001)

Quality of Service, graduate course (since 2001)

Research vision

Bring theory to the realm of practical and realistic systems

In my Ph. D. years: control theory

In past papers with my students: game and optimization theory, network coding theory, economic markets, machine learning

Build actual working systems, rather than simulations

1998 – 2000: distributed visual tracking

2002 – 2004: an overlay development framework

2005 – 2009: working systems of network coding

2010 – 2020: cloud computing systems

2020 – 2023: federated learning

For more information

search for my name online

Objective of this course

To prepare students towards writing good papers in areas related to networking, cloud computing, and distributed systems research

Three concurrent tracks:
course lectures, self-motivated reading,
critiques + course paper

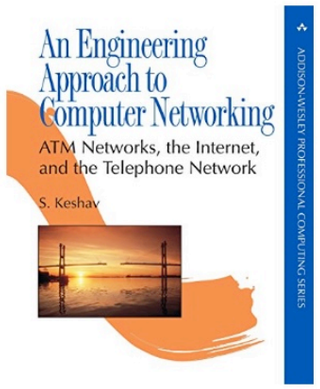
Required Textbooks

(Saltzer) J. Saltzer and M. Frans Kaashoek, "Principles of Computer System Design: An Introduction"

Available online — https://ocw.mit.edu/courses/res-6-004-principles-of-computer-system-design-an-introduction-spring-2009/pages/online-textbook/

(Keshav) S. Keshav, "An Engineering Approach to Computer Networking," Addison-Wesley, 1997

Not available online, but...



An Engineering Approach to Computer Networking: AT...
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★★★★½ (20696 ratings)
89% positive over the last 12 months

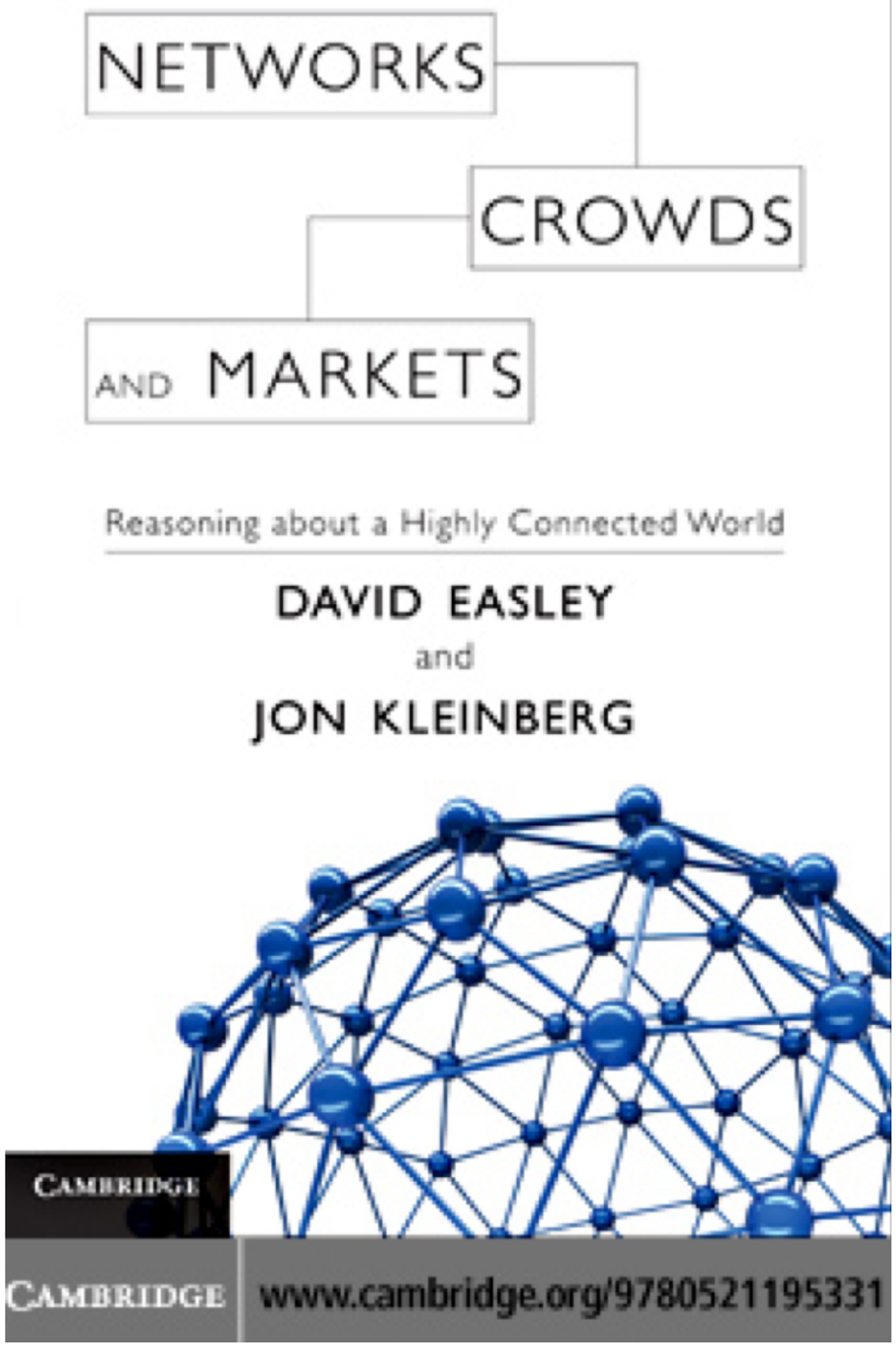
As of September 15, 2023

Required Textbooks

Chapter 6-15, D. Easley and J. Kleinberg, "Networks, Crowds, and Markets," published by Cambridge University Press, July 2010

a preprint is available online at

https://www.cs.cornell.edu/home/kleinber/networks-book/



Part I. "Packets"

A collection of fundamental design principles related to basic networking concepts

- Basic properties of networks
- The layering principle
- The link, network and end-to-end layers
- Flow and congestion control

Part II. “Fairness”

A detailed view of scheduling disciplines in a network switch, so that Quality of Service (QoS) can be achieved

Quality of Service is concerned with the “peace of mind” that resources are set aside to guarantee a particular level of performance

even with competition from other network flows sharing the same pool of resources

We will also be studying recent advances in allocating resources in datacenters

Part III. “Dynamics”

We switch to a macroscopic, rather than a microscopic, view of large-scale networks

We study dynamics, evolution, and resource allocation in these networks from a game-theoretic and an economic market point of view

We then progress to matching markets, sponsored search markets, web search, and MapReduce

Course assignments

Deliverables and final examination

Two deliverables of the course paper

Midterm paper draft (due October 20, 2023) (17%): 4 pages

Final paper (due December 22, 2023) (30%): 10 pages (builds on the previous deliverable)

IEEE Transactions LaTeX template, 11 point font in Times

Final examination (35%): December 15, 2023, Friday, 1-3 p.m.

Six weekly critiques (18%)

Read one designated paper in the week when it is assigned, starting September 29, 2023

Critique message to be sent to ece1771.2023@gmail.com by email, by the deadline (a Thursday 23:59) required on the course website

Do not submit attachments — plain text or rich text in the email body only

The email does not need to be long, just a few paragraphs would be good enough

The writing does not have to be formal, but needs to reflect your candid thoughts about the paper

Important dates and grading

Six critiques (Thursdays): 18% (3% each)

Midterm paper draft (17%): October 20, 2023, 11:59 p.m.

Final paper (30%): December 22, 2023, 11:59 p.m.

Final exam (35%): December 15, 2023, 3-5pm

Questions