ORIE 6180 - Design of Online Marketplaces

Instructor: Siddhartha Banerjee

Semester: Spring 2016

February 1, 2016

Essential Course Information

Instructor
Prof. Siddhartha Banerjee
Office: 229 Rhodes Hall
E-mail: sbanerjee@cornell.edu
Website: people.orie.cornell.edu/sbanerjee/
Office hours: Th 1:30pm-3:30pm (or by appointment)

Essential Course Information (contd.)

Lectures

Course Number: ORIE 6180

Class time: MW 10:10-11:25pm

Class location: Hollister 320

Course Communication:

Website: http://people.orie.cornell.edu/sbanerjee/ORIE6180/orie6180s16.html

BlackBoard for all announcements (search for ORIE 6180)

What is this course about?

Online Marketplaces

Courtesy: David Haber www.supplydemanded.com

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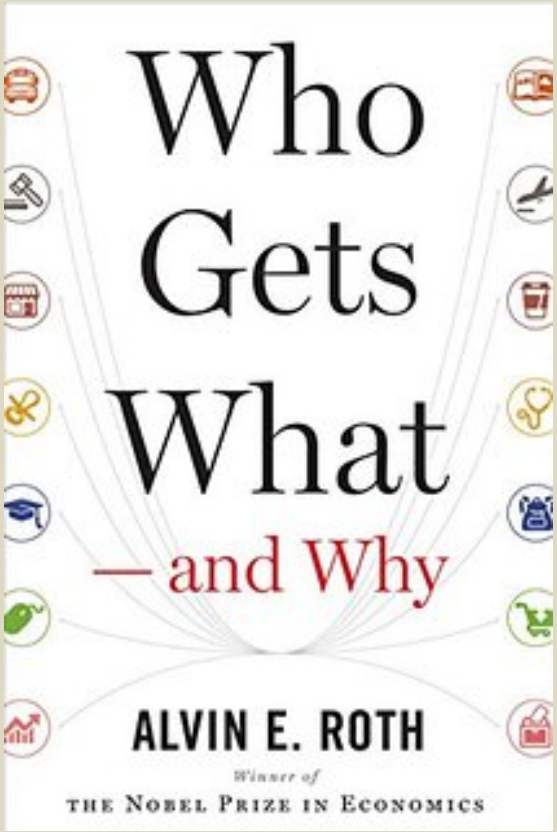
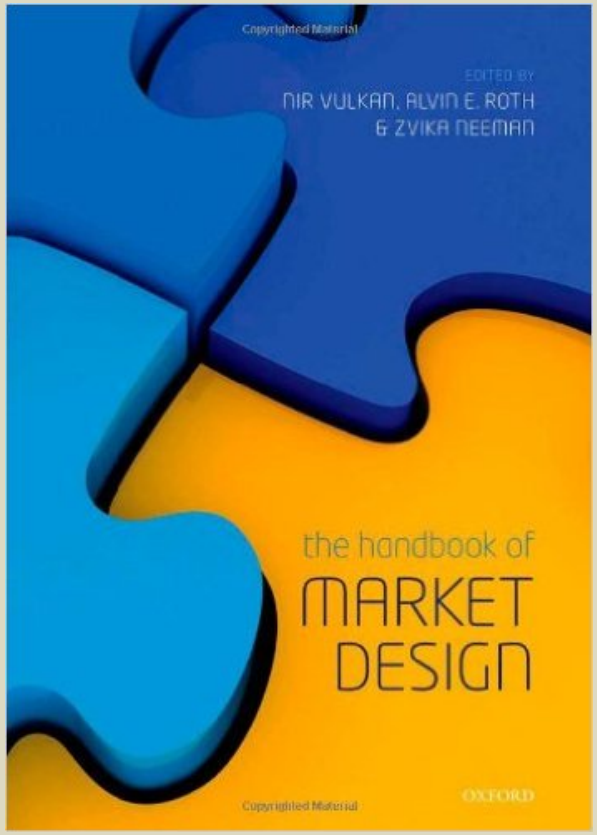
Market Design: Economics meets Engineering





The economist as engineer, Roth (2002)

What have we learned from market design?, Roth (2009)

Course Aims:

Prepare students for research on online and platform markets

Focus on discussing modeling issues, open theory questions

Tools: Mechanism design, price theory and applied probability

Course Methods:

Mix of lectures (for initial topics), seminar-style guided discussions (for latter topics, based on papers), and a project

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Caveat Emptor

We will try to understand the state-of-the-art by discussing active research, based on recent papers. The topics, techniques and level of difficulty may vary a lot.

You are not expected to read and understand every detail! More important: get a feel for how to think about issues in marketplaces, and how you can impact their design.

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Prerequisites:

Probability and stochastic processes (in particular, Markov chains and basic queueing theory): at the level of ORIE 6500

Optimization: at the level of ORIE 6300

Microeconomics and game theory: useful, but not required

How can theory help in designing online marketplaces?

A warmup example: The sponsored search auction

Internet advertising and the Generalized Second-Price Auction: Selling billions of dollars worth of keywords, Ostrovsky, Edelman and Schwarz (2007)

Position auctions, Varian (2007)

The Sponsored Search Auction

Want to sell k slots ('sponsored-links') on search results page

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Assumption: CTR if advertiser j given slot i is $\alpha_i \cdot \beta_j$

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Question

How do we design allocation and payment schemes such that:

We maximize 'social welfare'?

Advertisers reveal their value v_i?

Auctioneer makes maximum revenue?

A (tentative) list of topics

First unit: Tools for studying marketplaces

Mechanism design and auctions: DSIC and Myerson's lemma, revenue maximization, VCG.

'Second-best' mechanisms: Problems with optimal mechanisms, simple auctions and approximations.

Price theory of two-sided platforms: The Rochet-Tirole and Armstrong models, insulating tariffs.

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Second unit: Operational details of platform marketplaces

Search and visibility

Pricing

Reputation and Feedback

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Third unit: Additional topics

Platform competition: Cournot/Bertrand, networked markets.

Strategic experimentation and learning: Learning with strategic agents, learning in marketplaces.

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Course Material

There is no required textbook for the course.

Some books you may find helpful:

- For auction theory and mechanism design:
  - Tim Roughgarden's lecture notes (http://theory.stanford.edu/~tim/notes.html)
  - *Mechanism Design and Approximation*, Hartline
  - *Putting Auction Theory to Work*, Milgrom
- For Operations Management:
  - *The Theory and Practice of Revenue Management* , Talluri and van Ryzin
- General references for microeconomics and game theory:
  - *Game Theory for Applied Economists*, Gibbons
  - *Algorithmic Game Theory*, Nisan et al.
  - *Microeconomic Theory*, Mas-Colell, Whinston, and Green

Any papers we discuss will be posted on the website.

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Homework (20%):
2 homeworks – biweekly until 2nd week of March. Homeworks due on Friday 12pm.

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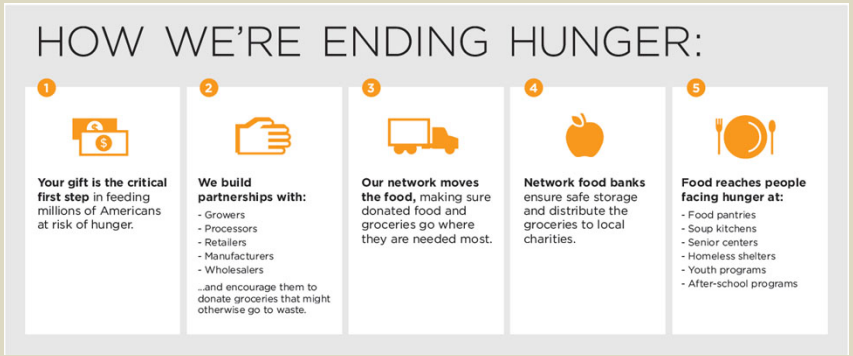
Project (50%):
Submit 2-3 page proposal + brief (1-2 slide) talk by **Wednesday, March 23, 2016** (before spring break)
Last 2 classes (May 9,11) reserved for student presentations
Final report due during finals period

A Closing Note

Markets are useful in places where you least expect them



Links: http://www.feedingamerica.org/, Canice Prendergast, Econ Log interview, Planet Money podcast