

ORIE 6180 - Design of Online Marketplaces

Instructor: Siddhartha Banerjee

Semester: Spring 2016

February 1, 2016

Essential Course Information

Instructor

Prof. Siddhartha Banerjee

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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)

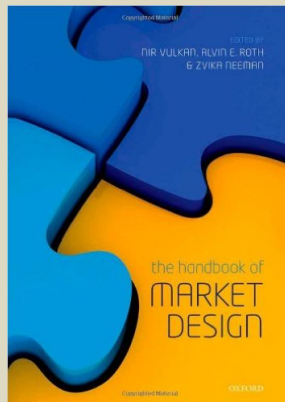
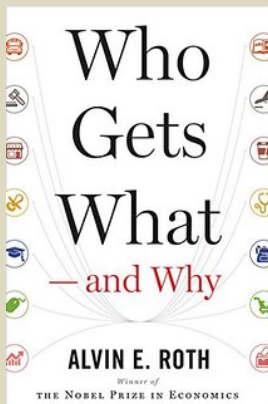
The diagram illustrates a vast network of connections between various websites, categorized into several main groups. The categories and their associated websites are as follows:

- new york city**: sidetour, Wheelz, Vayable, Core.com, lyR, DogVacay, GETYOURGUIDE, "Kiss about we...", ASHLEY MADISON, getabe, youPORN, Quora, Zaarly, consumerunited, SeatGeek, Blacklet, LendingClub, covestor, liftopia, uShip, eventup, CASTLIGHT, activities, last+bound, artists, childcare, general, groups, pitis, volunteers, events, classes, strictly platonic, women seek women, women seeking men, men seeking women, men seeking men, miss romance, casual encounters, missed connections, rants and raves, discussion forums, gila, helix, phish, arts, health, petis, help, psych, history, housing, recover, religion, politics, jesus, kink, science, L.L.R., diet, linux, spirit, divorce, too bad, mkn, tax, eco, money, testing, etiquet, motocy, transg, feedback, musis, travel, film, nge, veget, fitness, open, weed, firt, outdoor, weed, food, over 50, wine, fugal, p.o.c, women, gaming, parent, wirts, peto, writers
- community**: apt's / housing, rooms / shared, sublets / temporary, housing wanted, housing swap, vacation rentals, parking / storage, office / commercial, real estate for sale, appliances, arts+crafts, auto parts, baby+kids, beauty+hth, bikes, cars+trucks, books, cds+dvd+phones, business, computer free, furniture, general, jewelry, materials, motorcycle, music instr, photo+video, toys+games, video gaming, beauty, automotive, creative, farm+garden, computer, household, labor+move, skill+trade, real estate, event, financial, biz ads, leasors, marine, travel+vac, write+editr, pet
- housing**: accounting+finance, admin / office, arch / engineering, art / media / design, biotech / science, business / mgmt, customer service, education, food / bev / hosp, general labor, government, human resources, internet engineers, legal / paralegal, manufacturing, marketing / pr / ad, medical / health, nonprofit sector, real estate, retail / wholesale, sales / b2b dev, salon / spa / fitness, security, skilled trade / craft, software / qa / dba, systems / network, technical support, transport, tv / film / video, web / info design, writing / editing, [part-time], gigs, crew, computer, event, creative, labor+domestic, talent, writing, resumes
- jobs**: Airbnb, indeed, KICKSTARTER, kitchensurfing, onefinestay, Science EXCHANGE, article, turningArt, taskrabbit, bondsy, Etsy, Storenvy, VAUNTE, TheRealReal, VESTIAIRE (COLLECTIVE), ShopHealr, StackExchange, shopeways, Elance, oDesk, Bèhance, cherry, StyleSeat, Contently, Farmigo, Codecademy, coursera, Udacity, New Mechanic
- hiring**: Kaggle, Quartz, academic.edu, 2Floors, ThreadUp, GitHub, HAIL, UBER, workmarket, gige, Codecademy, coursera, New Mechanic
- education**: Coursera, edX, Udacity, New Mechanic
- business**: Coursera, edX, Udacity, New Mechanic
- entertainment**: Coursera, edX, Udacity, New Mechanic
- health**: Coursera, edX, Udacity, New Mechanic
- travel**: Coursera, edX, Udacity, New Mechanic
- finance**: Coursera, edX, Udacity, New Mechanic
- technology**: Coursera, edX, Udacity, New Mechanic
- art**: Coursera, edX, Udacity, New Mechanic
- science**: Coursera, edX, Udacity, New Mechanic
- sports**: Coursera, edX, Udacity, New Mechanic
- food**: Coursera, edX, Udacity, New Mechanic
- fashion**: Coursera, edX, Udacity, New Mechanic
- lifestyle**: Coursera, edX, Udacity, New Mechanic

The diagram is a dense web of connections, with many websites appearing in multiple categories and being connected to many other websites. The connections are represented by lines of varying thickness, indicating the strength or frequency of the relationships between the websites. The overall structure is highly interconnected, reflecting the complex nature of the digital landscape.

What is this course about?

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

Bidders are advertisers competing for keyword

Advertiser j has a 'valuation' v_j for a click

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Slot i has a 'click-through-rate' (CTR) of α_i , with

$\alpha_1 \geq \alpha_2 \geq \dots \geq \alpha_k$.

Advertiser j has 'quality' β_j

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.

Back to Administrivia

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.

Coursework and Grading

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