Professor Colin Stewart

Office Hours: Mondays 11am–12pm

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ECO426H1F: Market Design
Fall 2017

Classes: 2:10–4:00pm Wednesdays in OI 8280

Topics: The first half of the course will be devoted to the study of auctions. We will begin with the basic theory of auctions of a single object, exploring theoretical models of bidding in various auction formats and questions of how to design auctions to maximize revenue or efficiency. We will then move on to auctions of multiple objects, with an emphasis on radio spectrum auctions and keyword search auctions, exploring how these auctions operate in practice and how insights from the basic theory inform their design.

The second half of the course will explore the theory and practice of centralized matching markets, including the problems of matching students to schools, medical residents to hospitals, and donors to recipients for kidney transplants.

Evaluation:
Term Test 1 - 35%
Term Test 2 - 25%
Final Paper - 35% and Reflection - 5%

Term tests. Both tests will take place during class time (from 2:10-4pm). The first will be on October 18th and the second on November 29th. The format and location of the tests will be announced closer to the dates on which they occur.

Students who miss a test due to a medical issue must notify me by email before the exam begins. An original Verification of Student Illness or Injury Form completed by a licensed medical doctor or nurse practitioner must be provided to me within one week of the exam date. If I find the documentation acceptable, I will schedule a make-up exam. Participating students will be notified of the date and time of the exam by email, possibly as late as the evening before the make-up will take place. Any student who misses the make-up exam will get zero; there will be no make-up make-up. Note that providing false or misleading information in support of a request for a make-up is a serious academic offense.

Final paper. As you know, the number of spaces for students in courses at U of T is limited. For the final paper, you will write a proposal describing how to design the rules for allocating students to courses. These rules should take the courses offered and the space in each course as given; your design cannot, for example, involve increasing the number of sections of a highly demanded course. Your paper should clearly outline the main goals that are to be achieved by the matching mechanism, as you see them. (It may be helpful to describe here any major problems you see with the system currently in use.) You should then provide a detailed description of a proposed mechanism. It is critical that this description be precise and unambiguous, leaving no doubt as to how the mechanism would operate. Finally, you should explain how well you expect your design to achieve the goals that you outlined, and identify any particular strengths and weaknesses relative to the current system.

Your paper will be evaluated on the merits of the proposal, together with the clarity and depth of reasoning you provide. The ideal paper will combine insights from theory we discuss in class with careful consideration of practical issues. There is no length requirement; take whatever space you need, while being careful to write concisely. As a very rough guide, I expect 1500–2000 words to be typical, although shorter or longer papers are perfectly acceptable. However, unnecessary length due to repetition or irrelevant digressions will be penalized.

You may write the paper either individually or together with one other student. If you choose to work as a pair, you must let me know by email at least three weeks before the paper is due (i.e., by November 15th). Pairs should submit a single essay with both names on it.

Papers are due at midnight at the end of the day on December 6th. Late papers will be penalized at a rate of 10 percentage points each day (incurred at midnight). This penalty will not be waived, nor will individual extensions be granted, even with a medical note. We will use turnitin.com for paper submission. Please note the following (taken from the official University policy):

> Normally, students will be required to submit their course essays to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site.

Students who choose to opt out of this service must inform me by the end of October, and are to submit pdf versions of their papers by email to colinbstewart@gmail.com.

Reflection. A 1–2 page personal reflection on the final paper is also due at midnight on December 6th. In this reflection, you should explain how you arrived at the mechanism proposed in your paper. What kinds of mechanisms did you consider and reject? Why? Was there a particular issue in formulating the design that you found particularly challenging to address? Reflections must be written individually, even by those of you working in pairs on the paper. To avoid suspicion of misconduct, I strongly recommend that you not discuss your reflections with any other classmates (including your partner on the paper).

ACADEMIC INTEGRITY: Suspected cases of academic dishonesty will be taken very seriously. Please familiarize yourself with the Code of Behaviour on Academic Matters. Additional information is available at http://www.artsci.utoronto.ca/osai and http://life.utoronto.ca/get-smarter/academic-honesty/. Note that being unaware of rules or policies is not a valid defense in cases of academic dishonesty.

TA: The TA for the course is Chris Dobronyi. He will hold occasional office hours at times and locations to be announced later. His email address is christopher.dobronyi@mail.utoronto.ca.

EMAIL: Email should be used only for logistical questions about the course. Questions about course content should be asked in person, either at office hours or after class. If you do not receive a response to an email within two days, please resend it.

Course materials and announcements will be posted on Blackboard. You are responsible for checking Blackboard regularly.

IMPORTANT DATES:
Oct 18: term test 1 (in class)
Nov 29: term test 2 (in class)
Dec 6: final paper due

RECOMMENDED READING:
Auction theory

Chapter 9 of *Networks, Crowds, and Markets: Reasoning about a Highly Connected World*, by D. Easley and J. Kleinberg, Cambridge University Press, 2010. Available at `http://www.cs.cornell.edu/home/kleinber/networks-book/networks-book-ch09.pdf`

Auction Theory, by V. Krishna, Academic Press, 2010. Available online through the U of T library.

Spectrum auctions

"The biggest auction ever: The sale of the British 3G telecom licences," by K. Binmore and P. Klemperer, *The Economic Journal* 112, 2002, pp. C74–C96. Available at `http://www.jstor.org/stable/798361`

"Selling spectrum rights," by J. McMillan, *Journal of Economic Perspectives* 8(3), 1994, pp. 145–162. Available at `http://www.jstor.org/stable/2138224`

Keyword search auctions

"Internet advertising and the generalized second-price auction: Selling billions of dollars worth of keywords," by B. Edelman, M. Ostrovsky, and M. Schwarz, *American Economic Review* 97(1), 2007, pp. 242–259. Available at `http://www.jstor.org/stable/30034393`

"Strategic bidder behavior in sponsored search auctions," by B. Edelman and M. Ostrovsky, *Decision Support Systems* 43, 2007, pp. 192–198. Available at `http://web.stanford.edu/~ost/papers/cycling.pdf`

Matching markets

Two-Sided Matching: A Study in Game-Theoretic Modeling and Analysis, by A.E. Roth and M.A.O. Sotomayor, Cambridge University Press.

Who Gets What—and Why: The New Economics of Matchmaking and Market Design, by A.E. Roth, Houghton Mifflin Harcourt.

"What have we learned from market design," by A.E. Roth, *The Economic Journal* 118, 2008, pp. 285–310. Available at `http://www.jstor.org/stable/20108798`

School choice

"The Boston public school match," by A. Abdulkadiroglu, P.A. Pathak, A.E. Roth, and T. Sönmez, *American Economic Review* 95(2), pp. 368–371. Available at `http://economics.mit.edu/files/3021`

"The New York City high school match," by A. Abdulkadiroglu, P.A. Pathak, and A.E. Roth, *American Economic Review* 95(2), pp. 364–367. Available at `http://economics.mit.edu/files/3024`

"What really matters in designing school choice mechanisms," by P.A. Pathak, in *Advances in Economics and Econometrics, 11th World Congress of the Econometric Society.* Available at `https://economics.mit.edu/files/12799`

Kidney exchange

Section 2 of "Matching, allocation, and exchange of discrete resources," by T. Sönmez and M.U. Ünver, in *Handbook of Social Economics* Vol. 1A, 2011. Available at `https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1311517`

"Kidney exchange and the Alliance for Paired Donation: Operations research changes the way kidneys are transplanted," by R. Anderson et al., *Interfaces* 45(1), pp. 26–42. Available at `http://pubsonline.informs.org/doi/pdf/10.1287/inte.2014.0766`