ECON 4050-001 Market Design Spring 2021

Instructor: Oleg Baranov (*Assistant Professor, Department of Economics*)

Instructor Info		Class Info	
Office:	ECON 14A	Class Location:	*N/A, online class*
Voice:	303.492.7869	Meeting Times:	*N/A, online class*
Email:	oleg.baranov@colorado.edu	Office Hours:	TTH 10:00 | 11:00
Website:	www.obaranov.com	(by Zoom)	(or by appointment)

1 Class Website

All course materials will be posted on the Canvas website that can be accessed at https://canvas.colorado.edu/.

2 Instructions

This class will be taught ONLINE and delivered asynchronously which means there are not scheduled days and times. All class materials (including video lectures), activities and assignments are hosted on the class Canvas page. Students can complete the coursework throughout the week when it is convenient for them. Students must meet all milestones (assignments and class activities) that are assigned for a particular week. Instructions for each week will be posted on the class page (Announcements Tab).

3 Communication

The working communication channel is extremely important in online classes. Every student in the class needs to make sure that his or her email address is listed correctly on Canvas, and that he or she receives all class emails. It is important to monitor your email, especially around "Due" days and times. In this class, I will assume that all students have received, read, and responded (if needed) to my emails after 24 hours from their "sent" times.

4 Course Description

Economists are increasingly involved not just in studying but in designing practical market mechanisms. These include auctions to sell diamonds, timber, electricity, procurement contracts and radio spectrum; matching algorithms to assign students to schools, or candidates to jobs; as well as marketplaces and mechanisms to sell internet advertising, trade nancial securities, or reward innovation. The eld of market design studies how to construct rules for allocating resources or to structure successful marketplaces. It draws on the tools of game theory and mechanism design to identify why certain market rules or institutions succeed and why others fail.

The course consists of three parts. In the rst part, we review the fundamental concepts from the game theory and develop strategic thinking. In the second part, we look at the \matching markets" that operate without prices, highly unusual for economics. Examples include assigning students to schools, assigning donor kidneys to transplant patients and college admissions. The third part of the class is on auctions and good auction design. Examples range from simple auctions used by eBay and Christie's to auctions used in nancial markets, auctions used by Google, Facebook and Microsoft to sell advertising, and auctions used by government to sell large-scale complex assets such as radio spectrum.

5 Textbook/Readings

8 Assessment

There will be two midterm exams, the final exam and ten problem sets.

Class Activities	*30 games/exercises*	15% of the grade (dropping two lowest scores)
Problem Sets	*10 problem sets*	25% of the grade (dropping one lowest score)
Midterms	*2 midterms*	20% each
Final Exam		20%

There will be no make-up exams. A student who misses a midterm due to an excused absence will have the additional weight shifted to the final. Feel free to form study groups to review and discuss

9 Tentative Course Outline

Week	Covered Material	Slidepack
	MODULE 1: GAME THEORY	
1	Dominance and Iterative Dominance	1a
2 - 3	Nash Equilibrium	1b
4	Mixed Strategies & Dynamic and Bayesian Games	1c
5	MIDTERM I	
	MODULE 2: MATCHING	
6	Two-Sided Matching	2a
7	Two-Sided Applications	2b
8	One-Sided Matching, Kidney Exchange	2c
9	MIDTERM II	
10	School Choice	2d
	MODULE 3: AUCTIONS	
11 - 12	Auction Theory	3a
13	Auction Design	3b
13	Common-Value Auctions	3c
14	Multi-Item Auctions	3d
15	Sponsored Search Auctions	3e
16	Financial Exchanges	3f
	FINAL EXAM	

10 Tutors

The Economics Department provides a free drop-in tutorial lab which provides assistance on all core courses in the major, and occasionally on other undergraduate courses in the Department. See appropriate links here `https://www.colorado.edu/economics/undergraduate-program`.

11 Detailed Course Outline

1. Overview of the class (syllabus, overview of the content, introduction into game theory and market design)

Game Theory Part

2. Static Games (dominant and dominated strategies, iterative elimination of dominated strategies, Nash Equilibrium)

3. Dynamic Games (subgame perfect equilibrium and backward induction)

4. Incomplete Information (simple games with incomplete information, concept of Bayesian Nash equilibrium)

Matching Part

5. Introduction to Matching Markets (\marriage market" and one-to-one matching, stable matches, the Deferred Acceptance algorithm, existence result, optimal matches for both sides of the market, incentives of participants, roommate problem)

   Readings:

   \College Admissions and the Stability of Marriage" by David Gale and Lloyd Shapley (1962)

6. Stable Matching and Orderly Markets (stable matchings and orderly markets, the problem of market unravelling, case study: medical residents and the NRMP, medical fellowships, law clerks, college admission)

   Readings:

   \What Have We Learned from Market Design" by Alvin Roth (2008)

   \The Re-Design of the Matching Market for American Physicians: Some Engineering Aspects of Economic Design" by Alvin Roth and Elliott Peranson (1999)

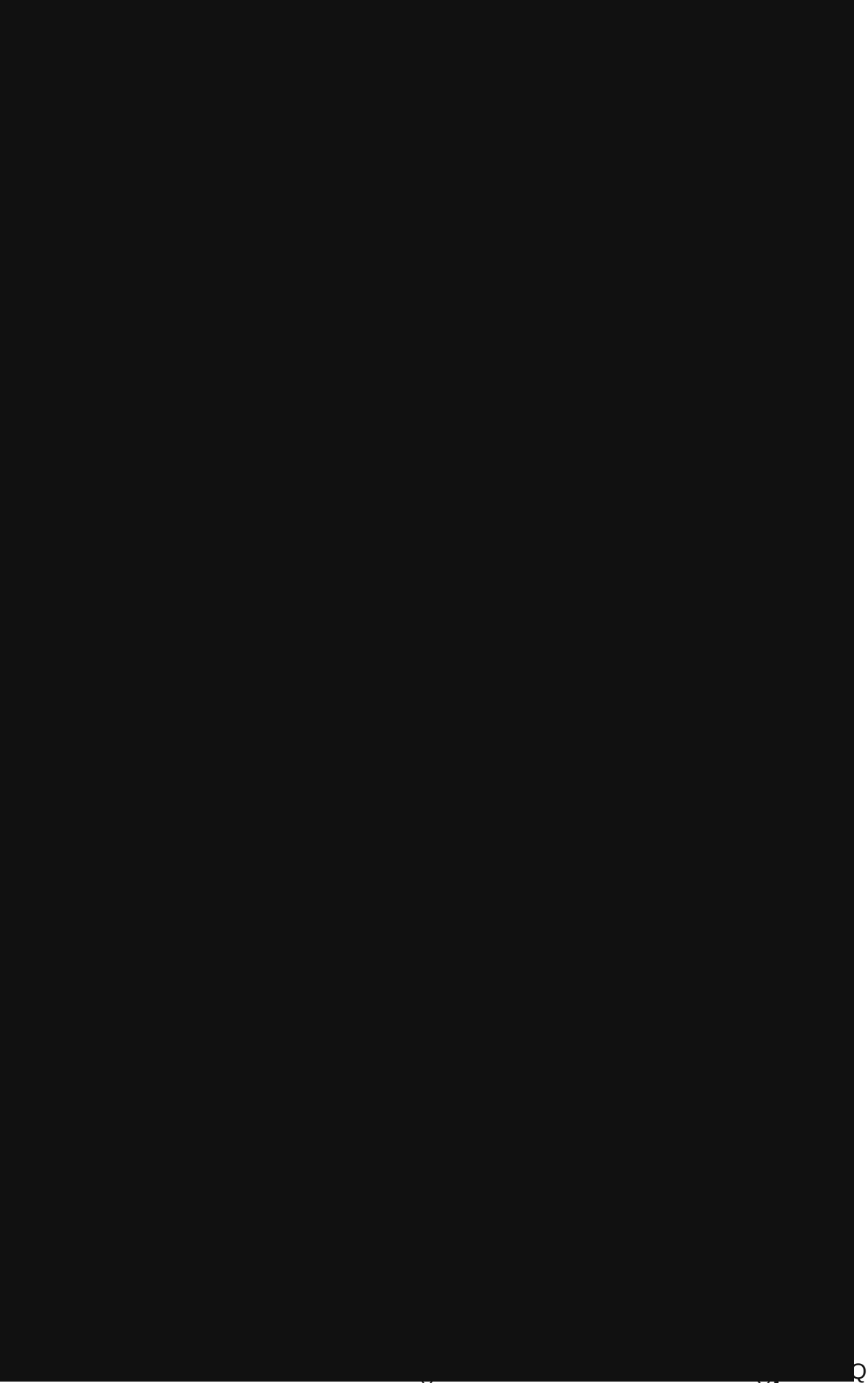
7. House Allocation and Kidney Exchange (House Allocation Problem, e cient outcomes and the core, serial dictatorship, the top trading cycles algorithm and its variations, kidney exchanges)

   Readings:

   \A Kidney Exchange Clearinghouse in New England" by Alvin Roth, Tayfun Sonmez and Utku Unver (2005)

   \Kidney Exchange: A Life-Saving Application of Matching Theory" (2005)

8. School Choice (School Choice Problem, the Boston algorithm and its incentives, deferred



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