1 Course Description and Objectives

There is a myriad of market mechanisms to allocate resources that can be classified as auctions. These are currently used in various markets ranging from art objects to fresh fish, from electricity to treasury bonds, from government procurement to internet ads.

This course has three main objectives. First, students will learn how these various market mechanisms work. We will discuss the theoretical foundations behind them as well as explore many real-world applications. We will use game theory to analyze bidders’ strategic interaction and characterize their behavior. Second, students will learn how the market rules can be modified to attain specific objectives and to derive policy recommendations. Finally, students will learn the recent empirical methods to analyze auction data needed to conduct research in auctions.

This class is designed for students with a strong quantitative background. Since the work of Vickrey (1961), we can think of auctions as an application of games of incomplete information and, thus, this class is a complement to Game Theory. I will not assume any knowledge of Game Theory and will spend the first part of this course introducing all the necessary concepts of Game Theory. Even though we will discuss many real-world applications, you can expect this class to be on the theoretical side.

After the introduction to Game Theory, we will examine the theoretical models behind the most commonly used auction formats: English, Dutch, first- and second-price. Students will learn the core theoretical results and will be exposed to recent empirical research in auctions. We will then spend some time discussing topics in auction design. Next, students will be introduced to the state-of-the-art empirical approaches to analyze auction data. Finally, we will discuss more advanced topics including multi-unit and internet auctions.
2 Administrative Info

- The class meets on Tue and Thu 3:30PM-5:00PM in BRB 2.136
- Contact information
  - Email: jbalat@utexas.edu
  - Office Hours: TBA
- Teaching assistant: James Brand
  - Email: jamesbrand@utexas.edu
  - Office Hours: TBA
- It is your responsibility to check the course webpage on Canvas for announcements, assignments, and other material.
- Pre-requisites for undergrads: Economics 420K (Microeconomic Theory) with a grade of at least C-; ECO 341K (Econometrics) with a grade of at least C-
- Any part of this syllabus is subject to change

3 Requirements

Class Participation and Readings (5%) Active student participation is essential to a successful learning environment. Students are expected to complete the reading assignments before each class and participate in the discussions. I will ask questions and encourage you to ask questions as well. There will be short quizzes for some of the assigned readings. Finally, to create a setting suitable for participation, no electronic devices (phones, tablets, laptops, etc.) will be allowed.

Problem Sets (20%) There will be regular problem sets, assigned during the semester. The problem sets are designed to give the students an opportunity to review and enhance the material learned in class. Hard-copies must be turned in at the beginning of class on the specified due dates. Late submissions are not accepted. Problem sets will be posted on the course web page. You are responsible for checking the website and downloading the questions.

Students are encouraged to form small study groups. At the stage when you are figuring out how to do a homework problem, you are welcome to discuss with others how to set up the problem, and the strategy for solving it. Once you’ve solved the problem, you are welcome to compare your answer with those of others, and to discuss the sources of any differences between your answers. However, each student is expected to write up their own answers independently. If your answer(s) and those of another student are identical or too similar, this may be taken as evidence that you have not written up your answers independently. Should “copying” occur, both the student who copied work from another student and the student who gave material to
be copied will receive a zero for the entire homework assignment, and failure of the course and University disciplinary action may be involved. Permissible collaboration should never involve one student having possession of another student’s answers (a copy of all or part of work done by someone else, in the form of an e-mail, a document attached to an email or on a flash drive or other storage device, or a hard copy, whether handwritten, photocopied, or printed).

*Midterms (50%)* There will be two in-class midterms.

*Final Project (25%)* Each student will be required to write a short paper. More details TBA.

Your weighted average course score will be computed from your scores on these components, and a grade will be assigned based on your score relative to the distribution of scores in the class. There will be different curves for undergrad and MA students. This approach allows me to assign letter grades without an absolute scale, and to adjust the percentages of the class receiving different letter grades (within limits). The percentage of students receiving any particular letter grade is not predetermined. It is possible for all students to get a C or above, and for the large majority to receive an A or a B. However, lower grades will be assigned to students who do not demonstrate proficiency or mastery of the material. Pluses and minuses will be used.

### 4 Student Accommodations

Students with a documented disability have the right to request appropriate academic accommodations from the Division of Diversity and Community Engagement, Services for Students with Disabilities, 512-471-6259 (voice) or 1-866-329-3986 (video phone). [http://ddce.utexas.edu/disability/about/](http://ddce.utexas.edu/disability/about/)

- Please request a meeting as soon as possible to discuss any accommodations
- Please notify me as soon as possible if the material being presented in class is not accessible
- Please notify me if any of the physical space is difficult for you

### 5 Academic Integrity

The strength of the university depends on academic and personal integrity. Each student in the course is expected to abide by the University of Texas Honor Code:

> As a student of The University of Texas at Austin, I shall abide by the core values of the University and uphold academic integrity.
This means that work you produce on assignments, tests and exams is all your own work, unless it is assigned as group work. I will make it clear for each test, exam or assignment whether collaboration is encouraged or not.

Always cite your sources. If you use words or ideas that are not your own (or that you have used in previous class), you must make that clear otherwise you will be guilty of plagiarism and subject to academic disciplinary action, including failure of the course. You are responsible for understanding UT’s Academic Honesty Policy which can be found at the following web address:

http://deanofstudents.utexas.edu/sjs/acint_student.php

6 Textbooks

The course will mostly use academic papers and class notes. The following textbook is required


The book is a concise and comprehensive guide to the economic analysis of auctions, and I highly recommend it. It does not include a formal mathematical treatment of the different topics but it is a great source for the intuition behind each topic.

Here is a list of books that are highly recommended (but not required) to supplement assigned readings and/or your research:

- Auction Theory

    UT-Austin has rights to the online version:


    It’s free online:

    http://www.nuff.ox.ac.uk/users/klemperer/VirtualBook/VBCrevisedv2.asp


7 Course Outline

This outline is tentative and, if time permits, we will be able to cover all topics in the order that follows.

Readings marked with an asterisk (⋆) are required.

1. Introduction

Readings: (K) Chapter 1


2. (A Very Quick Review of) Probability Theory

3. (An Introduction to) Game Theory

3.1 Games of Complete Information

Topics: Normal-form representation of games; Iterated elimination of strictly dominated strategies; Nash Equilibrium; Examples; Mixed strategies; Existence of Nash Equilibrium

3.2 Games of Incomplete Information

Topics: Normal-form representation of games of Bayesian games; Bayesian Nash Equilibrium; Examples

4. Auction Theory and Applications


4.1 Private Value Auctions

Topics: The private value model of auctions; Ascending auctions; First and second price sealed bid auctions; All-pay auctions

Readings: (K) Chapter 2

4.1.1 The Revenue Equivalence Theorem

Readings: (K) Chapter 3

4.1.2 Extensions

Topics: Asymmetries; Affiliation; Risk averse bidders

Readings: (K) Chapter 4


4.2 Auction Design


**Topics:** Optimal reserve price; Encouraging participation; Bid preference programs

**Readings:**


Samuelson (1985), “Competitive Bidding with Entry Costs”, *Economic Letters*


**4.3 Common Value Auctions**

**Topics:** The common value model of auctions; The winner’s curse; Examples and applications; When do prices aggregate information; Application to oil lease auctions

**Readings:** (K) Chapters 6 & 7

(*) Capen, Clapp, and Campbell (1971), “Competitive Bidding in High-Risk Situations”, *Journal of Petroleum Technology*


5. Empirical Analysis of Auction Data

Topics: Nonparametric density estimators; Structural estimation

6. Other Topics

6.1 Collusion

Topics: Bid rigging and collusion; Theory and empirical applications
Readings: (K) Chapter 11

6.2 Multi-Unit Auctions

Topics: Multi-Unit auctions; Uniform price auctions; Discriminatory price auctions; Demand reduction; Vickrey pricing; Sequential auctions; Examples and applications; Efficient auction design
Readings: (K) Chapters 12 & 13


6.3 Internet Auctions

Topics: eBay Auctions; Sponsored Search Auctions; Google’s advertising auction


(*) Bajari and Hortacsu (2004), “Economic Insights from Internet Auctions”, *Journal of Economic Literature*


(*) *The Economist*, Aug 29th 2015, “Economists may idolise auctions, but most people do not”


Tentative and subject to change. HP refers to the corresponding chapter in Hubbard and Paarsch.

<table>
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<th>Date</th>
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The Economist “Economists may idolise auctions, but most people do not” Varian (2007)