

Course title: Auctions and Mechanism Design				
Course code: MPE 157		No. of credits: 4	L-T-P: 54-6-0	Learning hours: 60
Pre-requisite course code and title: MPE 137 Microeconomics II; MPE 113 Mathematical Methods for Economics				
Department: Department of Policy and Management Studies				
Course coordinator: Sanyyam Khurana			Course instructor: Sanyyam Khurana	
Contact details:				
Course type: Elective			Course offered in: 3 rd Semester	
<p>Course description:</p> <p>The course is divided into two parts. In the first part, we will study the positive theory of auctions. In the second part, we will study the normative aspects of auction theory. The entire course revolves around a situation wherein a seller wishes to allocate an object to one of the many buyers participating in an auction. Given an allocation and a payment rule, the first part addresses an important question that how the buyers interact strategically under incomplete information. We will use game-theoretic approach to develop important theoretical models in auctions addressing the above question.</p> <p>In the second part, we will study how to design the allocation and payment rules of an auction so that certain objectives of the designer (seller) are achieved.</p> <p>Furthermore, we will study some real-world applications on online auctions such as eBay and Amazon auctions, spectrum auctions, provision of public goods, etc.</p> <p>Although the course is technical in nature, the techniques will be developed throughout the course. Lecture notes will be provided.</p>				
Course objective:				
<div>1. To understand core results in the theory of auctions and mechanism design.</div> <div>2. To learn techniques involved in the theory of auctions and mechanism design.</div>				
Course contents				
Module	Topic	L	T	P
1	<p>Introduction to auction theory; real-world applications on spectrum auctions, online auctions, etc.</p> <p>Symmetric and independent private valuations model: Revenue equivalence principle; reserve prices.</p> <p>In this module, we will derive the bid functions and the revenue expressions for the first- and second-price auctions whenever bidders' valuations are drawn from a symmetric and statistically independent probability distribution and bidders are risk neutral. We establish an important property which is called "revenue equivalence principle".</p>	7	1	
2	<p>Model with risk averse preferences: Failure of revenue equivalence principle.</p> <p>In this module, we relax the assumption that bidders are risk neutral and capture the impact of risk aversion on the bid behaviour and seller's expected revenues.</p>	4		
3	<p>Asymmetric and independent private valuations model: Revenue rankings; comparison with symmetric model.</p> <p>In this module, we relax the assumption of symmetry and study its impact of the bid behaviour and seller's expected revenues.</p>	8	2	

4	<p>Resale model: Bid symmetrisation property; revenue ranking principle.</p> <p>In this module, we allow for the possibility of resale of the object once the auction ends. We establish a striking property regarding the bid behaviour which is called “bid symmetrisation”.</p>	6		
5	<p>Introduction to mechanism design theory; real-world applications on the allocation of public goods.</p> <p>Implementation theory. Revelation principles.</p> <p>In this module, we motivate the theory of mechanism design and study the problem of implementation for different equilibrium concepts. We capture a striking result known as revelation principle.</p>	6		
6	<p>Bayesian incentive compatible mechanisms I: screening with linear utilities; screening with quasilinear utilities; optimal contract design.</p> <p>In this and the next module, we extensively study applications of the following equilibrium concept: Bayesian equilibrium.</p>	8	1	
7	<p>Bayesian incentive compatible mechanisms II: optimal auction design; bilateral trade.</p>	9	2	
8	<p>Dominant strategy incentive compatible mechanisms: Vickrey-Clarke-Groves mechanism; auctions.</p> <p>In this module, we study applications of the following equilibrium concept: Dominant strategy equilibrium.</p>	6		
	Total	54	6	
<p>Evaluation criteria:</p> <p>Minor 1: Written Examination - 25% [Syllabus: 1, 2, and 3. Learning outcomes: 1 and 2]</p> <p>Minor 2: Presentation - 25% [Learning outcomes: 1 and 2]</p> <p>Major: Written Examination (whole course) - 50% [Syllabus: 1-8. Learning outcomes: 1, 2 and 3]</p>				
<p>Learning outcomes:</p> <ol style="list-style-type: none"> 1. The students will learn to formulate auctions as a game of incomplete information. [Modules 1-8] 2. They will understand the impact of relaxing the standard assumptions on the behaviour of buyers and seller. [Modules 2-4] 3. They will learn to design an optimal mechanism that satisfies the seller’s objectives. [Modules 6-8] 				

Core readings:

1. V. Krishna. "Auction Theory", Academic press (2009)
2. T. Borghers, D. Krahmer. "An introduction to the theory of mechanism design", Oxford university press, USA (2015)
3. Lecture notes

Additional readings:

1. D. Diamantaras, E. Cardamone, K. Campbell, S. Deacle, L. Delgado. "A toolbox for economic design", Macmillan (2009)
2. R. Myerson. "Optimal auction design", Mathematics for Operations Research (1981)
3. P. Klemperer. "What really matters in auction design", Journal of Economic Perspectives (2002)
4. E. Maskin, J. Riley. "Asymmetric auctions, The Review of Economic Studies (2000)
5. I. Hafalir, V. Krishna. "Asymmetric auctions with resale", The American Economic Review (2008)
6. R. McAfee, J. McMillan. "Analyzing the airwaves auction", Journal of Economic Perspectives (1996)
7. D. Lucking-Reiley. "Auctions on the internet: What's being auctioned, and how?", The Journal of Industrial Economics (2000)
8. K. Binmore, P. Klemperer. "The biggest auction ever: The sale of the British 3G telecom licences", The Economic Journal (2002)
9. A. Roth, A. Ockenfels. "Last-minute bidding and the rules for ending second-price auctions: Evidence from eBay and Amazon auctions on the internet", The American Economic Review (2002)
10. R. Alston, C. Nowell. "Implementing the voluntary contribution game: A field experiment", Journal of Economic Behavior & Organization (1996)
11. O. Ashenfelter. "How auctions work for wine and art", Journal of Economic Perspectives (1989)
12. Y. Chen, C. Plott. "The Groves-Ledyard mechanism: An experimental study of institutional design", Journal of Public Economics (1996)
13. J. Falkinger, E. Fehr, S. Gächter, R. Winter-Ebmer. "A simple mechanism for the efficient provision of public goods: Experimental evidence", The American Economic Review (2000)
14. E. Fehr, S. Gächter. "Cooperation and punishment in public goods experiments", The American Economic Review (2000)

Additional information:

Course prepared by: Sanyyam Khurana

Student responsibilities: Attendance, feedback, discipline: as per university rules.

Course reviewers:

1. Sudhir A. Shah. Professor, Department of Economics, Delhi School of Economics, University of Delhi.
2. Debasis Mishra. Professor, Economics and Planning Unit, Indian Statistical Institute, Delhi.