Microeconomics V

Module 5, Academic year 2022-2023

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Course information

Course Website: @my.nes

Instructor's Office Hours: TBA

Class Times: Wednesdays and Fridays

Room Numbers: 427, https://online.nes.ru/ol-427 (code: 196434)

TAs:

Course description

This course completes the core microeconomics sequence at MAE program. The two main intertwined topics to be covered are the social choice theory and mechanism design, with emphasis on aggregation of preferences and information, provision of incentives, with applications to voting, auctions, bargaining, and matching.

Course requirements, grading, and attendance policies

Successful completion of Micro I - Micro IV sequence is a prerequisite for this course.

There will be a number of problem sets, worth 40% of the grade, and a closed book final exam, worth 60% of the grade.

Course contents

Social Choice Theory (chapter 21 in MWG)
Mechanism Design and Auctions (chapter 23 in MWG, Krishna)
Full implementation in Nash equilibrium and according to other equilibrium concepts (Moore)
Bargaining Solutions, Shapley Value (chapter 22 in MWG, Moulin)
Two-sided Matching (Roth & Sotomayor)

Course materials

Required textbooks and materials

(MWG) Andreu Mas-Colell, Michael D, Whinston, and Jerry R. Green, *Microeconomic Theory,* Oxford University Press, 1995

Additional materials

Vijay Krishna, *Auction Theory,* Elsevier, 2002

Alvin E. Roth and Marilda A. Oliviera Sotomayor, *Two-Sided Matching*, Cambridge University Press 1990.

John Moore, *Implementation, contracts, and renegotiation in environments with complete information,* in: Advances in economic theory, Sixth World Congress, Vol.1, Cambridge University Press, 1992.

Herve Moulin, *Fair Division and Collective Welfare*, MIT Press, 2004.

David Kreps, *Microeconomic Foundations I: Choice and Competitive Markets,* Princeton university press, 2012.

Academic integrity policy

Cheating, plagiarism, and any other violations of academic ethics at NES will not be tolerated.

Sample tasks for course evaluation

1. There are four men (1, 2, 3 and 4) who must collectively choose one of four women w_1, w_2, w_3 and w_4 to be their president. All preferences are strict. Man 1 prefers w_1 to w_2 to w_3 to w_4, man 2 prefers w_4 to w_3 to w_1 to w_2, man 3 prefers w_2 to w_1 (but we do not know about his preferences over the other two women or how they compare to w_1 or w_2). Preferences of man 4 are not specified.
   (a) Give an example of (strict) preferences of men 3 and 4 such that all preferences are single peaked with respect to a particular linear order.
   (b) List all preferences of men 3 and 4 such that all preferences are single peaked with respect to a particular linear order.
   (c) For each preference profile you built in (b) identify all Condorcet winners. Does pairwise majority voting constitute a well-defined (i.e., producing rational group preferences) social preference aggregator?
   (d) Does there exist a preference profile of agents 3 and 4 other than those you found in (b) such that there exists a Condorcet winner?
   (e) Assume that all women also have strict preferences over all men such that all women are acceptable to all men and vice versa. For any single peaked preference profile you found in (b) a woman who is the best according to a median man (if there is more than one such man, one gets picked at random; assume everybody is risk neutral, i.e., being matched to second most preferred woman is indifferent for me to a 50-50 lottery between first and third) gets her most preferred man and the couple drops out. The procedure then repeats (with three remaining men and three remaining women) and then two more times. Does the procedure always result in a stable matching?

(f) Assume all agents first (simultaneously) announce their preferences and then procedure described in (e) is applied. Is truth telling by all men a Nash equilibrium for all preference profiles (assuming all women always submit true preferences)?

2. There is a single indivisible item initially belonging to the seller. The seller's valuation can be either low or high, with equal probabilities; in the former case it is distributed uniformly on [0,1], in the latter case – on [2,3]. Likewise, the buyer's valuation can be either low or high with equal probabilities, distributed uniformly on [1,2] or [3,4]. Valuations are independent (except 'high'-'low' realization in (a), see below).
   (a) Assume that seller's valuation is low if and only if so is buyer's. Construct a variation of the expected externality mechanism, where the agents first announce the state of the world ('high' or 'low') and then, if their announcements coincide, transfers are calculated accordingly (and if not, there is no trade and no transfers). Is it incentive compatible? Does it deliver efficient trade? Is it interim individually rational for all valuations of the buyer and the seller?
   (b) Assume that seller's valuation is high or low independently of buyer's. Construct the expected externality mechanism. Does it deliver efficient trade? Is it interim individually rational for all valuations of the buyer and the seller?
   (c) You are the mechanism designer with full bargaining power. Design an incentive compatible mechanism that (1) ensures efficient trade, (2) is interim individually rational and (3) maximizes expected value of $-t_1 - t_2$ (which is your profit).
   (d) Redo (c) with the following (relaxed) individual rationality requirement: each agent first only learns whether her valuation is low or high (but not the valuation itself) and only at this point can walk out.

3. There are four agents who all know the value of $\theta \in [0,1]$ (but the mechanism designer doesn't). Preferences of agent i over bundles of two available goods x and y are then given by $u_i(x_i, y_i) = x_i^{\theta} y_i^{1-\theta}$. The set of feasible allocations is

$$\{(x_1, x_2, x_3, x_4, y_1, y_2, y_3, y_4) | x_1 + x_2 + x_3 + x_4 \leq 2, y_1 + y_2 + y_3 + y_4 \leq 2\}.$$

4. The social choice rule assigns to each value of θ all Walrasian equilibrium allocations that can emerge from initial endowment where two agents each have one unit of good x and the other two agents each have one unit of good y.
   (a) Write social choice rule (θ) explicitly.
   (b) Is social choice rule (θ) monotonic?
   (c) Does social choice rule (θ) satisfy necessary conditions for being fully implementable in Nash equilibrium? Sufficient conditions? Is it implementable in Nash equilibrium?

Redo (a)-(c) assuming there are only two agents, one endowed with one unit of x and the other with one unit of y.