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GAME THEORY (EC7112)
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This course focuses mainly on game theory and strategic interactions. A situation involves strategic interaction if the best course of action of one agent depends on what others are going to do and vice-versa. These situations include, for example, competition among firms in an oligopolistic market, interaction between candidates in an election campaign, wage bargaining between a worker and an employer, and arms races between states. Although originally developed and applied in economics and mathematics, game theory is now commonly used in political science, biology etc. This course offers an (advanced) introduction to game theory with a special emphasis on examples and applications drawn from economics, political science, and other social sciences.

Required reading in this course is Martin J. Osborne, *An Introduction to Game Theory* (Oxford University Press, 2004). There is a course website on *Athena*, to which all students enrolled in the class will have access. All my lecture notes, handouts and problem sets will be posted there. Please check the website before each lecture in case there are lecture notes or handouts for that lecture.

Course requirements are a final exam (100%).

Below follows a brief description of the topics covered in the course.

Topics and Readings (from Osborne's book)

I. Static interactions and strategic form games: A static situation is one in which each actor must make one decision and does so in ignorance of what the other actors are doing. For example, two firms may have to decide how much to invest in R&D at the same time or two states may secretly decide how much to spend on defence. Sealed-bid auctions are also static interactions. In this part of the course, we will see how these situations can be represented as strategic form games and how we can solve these games.

A. What is game theory? Definition of strategies.

B. Dominant and dominated strategies, Iterated Deletion of Strictly Dominated Strategies (IDSDS), Iterated Deletion of Weakly Dominated Strategies (IDWDS)

C. Pure-strategy Nash equilibrium.

D. Problem set 1

E. Mixed-strategy Nash equilibrium.

F. Problem set 2

Readings: ch 1; ch 2; ch 3; ch 4.

II. Dynamic Interactions and Extensive-Form Games: An interaction is dynamic if at least one actor can respond to another actor's decisions when choosing an action. Bargaining between a buyer and seller is dynamic. The buyer can decide how to revise a previous offer based on the seller's latest offer. Arms races are also dynamic. A state can decide how much to spend this year in response to how much the other side spent last year.
Extensive form games provide a natural setting for the analysis of dynamic interactions. An extensive form is something like a flowchart for the situation we are trying to model. The extensive form describes the order in which the actors make decisions or take actions, what options they have to choose from, and what they know when they must make a decision. In this part of the course we will specify and analyze games on extensive form.

G. Strategies in games on extensive form, backward induction

H. Subgame perfect Nash equilibrium

I. Problem Set 3

Readings: ch 5; ch 6; ch 7.

III. Asymmetric information games: In all of the games discussed so far, there has been complete information at the start of the game. For example, every firm knows exactly how much costs are incurred by other firms when increasing their levels of output. But sometimes we encounter situations that entail some "private" information. That is, a firm has private information about its production costs. Incomplete or asymmetric information games provide a way of modelling situations, in which there is private information, i.e. situations in which the players do not have complete information about each other. In this part of the course we will discuss some simple examples of incomplete information games and how to analyze these.

J. Incomplete information games and Bayesian equilibrium

K. Auctions under imperfect information

L. Problem set 4

Readings: ch 9; ch 10.