1 Mechanism design

Mechanism design studies incentives by making intense use of incentive compatibility and direct mechanisms, concepts familiar from Economics 602. One has a social choice function or correspondence in mind, which encompasses the desirable behavior of the economy (for each economy we consider, it yields the desirable allocations; we evaluate outcomes only, not the process of reaching them). One then constructs a mechanism (a special kind of game) in order to have the equilibria of the game be desirable allocations according to the social choice function (or correspondence). The use of the revelation principle simplifies this process, since the mechanism designer can restrict her/his attention to direct revelation mechanisms and their truthful equilibria. The concept of equilibrium used varies, depending on the application and the objective of the research project. A recent survey of mechanism theory is Jackson [2001b]. A slightly older survey is chapter 23 in Mas-Colell et al. [1995]. An important recent contribution is Bergemann and Morris [2005].

The most ambitious mechanism design project seeks mechanisms in which the desired outcomes are outcomes of dominant strategy behavior on the part of the players. Generally, the results in dominant strategy mechanism design are negative, except in restricted domains, such as that where all agents have single-peaked preferences. Two classics in dominant strategy mechanisms are Gibbard [1973] and Satterthwaite [1975]. A recent survey is Barberà [2001].

In Bayesian mechanism design theory, the classic papers behind the Vickrey-Clarke-Groves mechanism are Clarke [1971], Vickrey [1961], and Groves [1973]. A recent generalization of this mechanism is in Krishna and Perry [1998].

An important recent paper on mechanisms allows endogenous side payments among players: Jackson and Wilkie [2005].
2 Implementation

Implementation theory is a more demanding version of mechanism design theory. In addition to requiring that the mechanism constructed has one desirable equilibrium (which is what one guarantees by using the revelation principle and direct revelation mechanisms) it also insists that all the equilibria of the mechanism are desirable. A recent survey of strategy-proof social choice functions (those truthfully implementable using dominant strategies) is Barberà [2001]. A recent survey of implementation in Nash equilibrium and some variants is Jackson [2001a]. A recent survey that also covers Bayesian implementation is Palfrey [2002].

Some classic papers in implementation theory are Hurwicz [1972] and Maskin [1999].

3 Course organization and grading

The class meets every Thursday from 4:40 to 7:10 p.m. in 203AB Tuttleman Hall. The first week will be devoted to an introduction to the course and advice on writing and presenting economics well. Subsequent meetings will be devoted to lectures and, near the end, oral presentations by the students on various topics, listed below. There will also be a written project, correlated with the oral presentation. Grades will be based, with equal weights, on the oral presentations and the written project.

3.1 The written project

In a previous incarnation of this course, the written project was to write jointly a book on the topic, aimed at economists who are not experts in mathematical economics or economic theory. This project proved enormous, and the work on it continues still. In fact, we will use the current version of the book, Diamantaras et al. [2005], in this course.

The written project for this course is different, and much smaller in scope. Each student will prepare a presentation of a subarea of the topic and (i) give a lecture to the class on it, (ii) submit a written version as the term paper for the course. Since there are no examinations for this course, the grade will be based on the lecture and term paper.

Since writing a paper is difficult, and in order to help you with your scholarly activities in your later career as economists, I recommend very
strongly that you read Thomson [2001]. It is available in paperback, and well worth its price.

The term paper should give a well-rounded presentation of the assigned topic. This means that the presentation should cover not only the assigned paper, but also a well-structured background section that summarizes previous literature and offers any necessary mathematical background (definitions and previous results).

3.2 Topics for the written project

The following papers are good possibilities: Matsushima [2006], Birulin [2006], Healy [2006], Manelli and Vincent [2006], Vartiainen [2006], de Vries et al. [2006], Sandholm [2006], Choi and Kim [1999], Baliga et al. [1997], Duggan [2003], Bergemann and Morris [2005], Neeman [forthcoming], Corchón and Wilkie [1996], Jackson and Palfrey [2001], Kalai and Ledyard [1998]. All these papers belong to the material you should master in this course, and will be included in the field examination in mathematical economics with emphasis on mechanism design and implementation, should any students wish to take it.

3.3 Texts

We will use many sources, most of which will be available free as PDF files or from Paley Library. However, you should purchase Thomson [2001] and Corchón [1996] as soon as possible. We will be making heavy use of these books, and the first one will be valuable to you for the rest of your career whether or not you pursue mechanism design further.

3.4 The weekly topics

A rough outline of the weekly topics is as follows.

**Week 1** Writing economics well. Read Thomson [2001]. Introduction: Social choice correspondences and resource allocation mechanisms. Read Diamantaras et al. [2005, Chapter 1], Hurwicz [1972], Hurwicz [1994].

**Week 2** Domains. Read Diamantaras et al. [2005, Part I], Corchón [1996, Chapter 1], Thomson [1999].

Week 4 Dominant Strategies, direct mechanisms, the revelation principle and implementation. Read Corchón [1996, Chapter 3], Barberà [2001], Barberà et al. [2001], Reny [2000].

Week 5 Nash implementation. Read Jackson [2001b], Serrano [2003], Diamantaras et al. [2005], Maskin [1999], Corchón [1996, Chapters 4,5].

Week 6 Subgame perfect implementation, undominated Nash equilibrium. Read Moore and Repullo [1988], Diamantaras et al. [2005], Jackson [1992]. Decide on term paper topic (see course requirements above).

Week 7 Bayesian implementation. Read Palfrey [2002], Corchón [1996, Chapter 7].

Week 8 Mechanism design, difference from implementation. Read Jackson [2001a], Jackson and Wilkie [2005], Jackson and Sonnenschein [2003].

Week 9 Vickrey-Clarke-Groves mechanisms. Read Krishna [2002, Chapter 5], Mas-Colell et al. [1995, Chapter 23], d’Aspremont et al. [2003b], d’Aspremont et al. [2003a], Fudenberg et al. [1995].

Week 10 Auctions I. Read Krishna [2002, Chapters 1-5].

Week 11 Auctions II. Read Krishna [2002, Chapters 6,7,8].


Week 13 Student presentations.

Week 14 Student presentations.

Week 15 Submit term paper.
References


