ECON6810 Special Topics in Economics: Mechanism Design and Related Topics

Spring 2017
Department of Economics
Chinese University of Hong Kong

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- Lectures: Friday 2:30-5:15pm @ 204 ELB
- Office Hour: Friday 10:00-11:00am

Course Description: This module aims to provide students rigorous and accessible explanations on the theory of mechanism design. The objectives are to focus on classic results, and to take the students in selected areas to the frontiers of research. We plan to cover static mechanism design in terms of Bayesian mechanisms and dominant strategy mechanisms, and emphasize the applications in economics, such as single unit auction, public goods, and bilateral trade. We shall discuss the recent developments of dynamic mechanism design in the last two decades as well. If time permits, we will also study some related topics, including adverse selection, cheap talk, verifiable disclosure, Bayesian persuasion, moral hazard, and implementation.

Learning Outcomes: After completing this course, the students are expected to:

1. Acquire basic knowledge in the theory of mechanism design;

2. Obtain preparations for conducting independent research in mechanism design.

Textbook There is no required textbook for this course. The lecture is mainly based on the lecture notes and papers on the reading list.

Grading:

- 30% Two assignments
- 40% Two referee reports
- 30% A class presentation

Course Outline:

1. Introduction

2. Static Mechanism Design: simple environment

   - Screening
   - Single unit auction, public goods, bilateral trade

3. Static Mechanism Design: general environment

   - Incentive Compatibility: weak monotonicity, cyclical monotonicity
   - Bayesian Mechanism Design: independent types, correlated types (full surplus extraction)
   - Dominant Strategy Mechanism: implementing efficient rules, individual rationality and budget balance
   - Robust Mechanism Design (Optional)

4. Dynamic Programming (to facilitate the discussion of dynamic environment)

   - Bellman equation
   - Preservation of continuity, monotonicity, convexity/concavity

5. Dynamic Mechanism Design

   - Dynamic Screening
   - Dynamic mechanisms in terms of welfare/revenue

6. Other standard models: market for lemon, cheap talk, verifiable disclosure, Bayesian persuasion, principal-agent problem, implementation (optional)

Supplementary readings:

* Kenneth Arrow, Social Choice and Individual Values, Wiley, New York, second edition, 1963.

* Susan Athey and Ilya Segal, An efficient dynamic mechanism, *Econometrica* **81** (2013), 2463–2485.

* David Baron and David Besanko, Regulation and information in a continuing relationship, *Information Economics and Policy* **1** (1984), 267–302.

* Marco Battaglini, Long-term contracting with Markovian consumers, *American Economic Review* **95** (2005), 637–685.

* Marco Battaglini and Rohit Lamba, Optimal dynamic contracting, working paper, 2015.

* Dirk Bergemann and Stephen Morris, Robust mechanism design, *Econometrica* **73** (2005), 1771–1813.

* Dirk Bergemann and Stephen Morris, An introduction to robust mechanism design, Foundations and Trends in Microeconomics **8** (2013), 169–230.

* Dirk Bergemann and Maher Said, Dynamic Auctions: A Survey, in: Wiley Encyclopedia of Operations Research and Management Science, Wiley, 2011.

* Dirk Bergemann and Juuso Valimaki, The dynamic pivot mechanism, *Econometrica* **78** (2010), 771–789.

* Sushil Bikhchandani, Shurojit Chatterji, Ron Lavi, Ahuva Mu'alem, Noam Nisan, and Arunava Sen, Weak monotonicity characterizes deterministic dominant strategy implementation, *Econometrica* **74** (2006), 1109–1132.

* Raphael Boleslavsky and Maher Said, Progressive screening: Long-term contracting with a privately known stochastic process, *Review of Economic Studies* **80** (2013), 1–34.

* Tilman Borgers, An Introduction to the Theory of Mechanism Design, Oxford University Press, 2015.

* Kim Sau Chung and Jeffrey C. Ely, Foundations of dominant strategy mechanisms, *Review of Economic Studies* **74** (2007), 447–476.

* Pascal Courty and Hao Li, Sequential screening, *Review of Economic Studies* **67** (2000), 697–717.

* Jacques Cremer and Richard McLean, Full extraction of the surplus in Bayesian and dominant strategy auctions, *Econometrica* **56** (1988), 1247–1257.

* Claude d'Aspremont and Louis-Andre Gerard-Varet, Incentives and incomplete information, *Journal of Public Economics* **11** (1979), 25–45.

* Peter Eso and Balasz Szentes, Optimal information disclosure in auctions and the handicap auction, *Review of Economic Studies* **74** (2007), 705–731.

* Alex Gershkov, Jacob K. Goeree, Alexey Kushnir, Benny Moldovanu, and Xianwen Shi, On the equivalence of bayesian and dominant strategy implementation, *Econometrica* **81**, 197–230.

* Matthew Jackson and Hugo Sonnenschein, Overcoming incentive constraints by linking decisions, *Econometrica* **75** (2007), 241–275.

* Philippe Jehiel and Benny Moldovanu, Efficient design with interdependent valuations, *Econometrica* **69** (2001), 1237–1259.

* Philippe Jehiel, Moritz Meyer ter Vehn, Benny Moldovanu, and Bill Zame, The limits of ex-post implementation, *Econometrica* **74** (2006), 585–611.

* Alejandro M. Manelli and Daniel R. Vincent, Multidimensional mechanism design: Revenue maximization and the multiple-good monopoly, *Journal of Economic Theory* **137** (2007), 153–185.

* Alejandro M. Manelli and Daniel R. Vincent, Bayesian and dominant-strategy implementation in the independent private values model, *Econometrica* **78** (2010), 1905–1938.

* Roger Myerson, Optimal auction design, *Mathematics of Operations Research* **6** (1981), 58–73.

* Roger B. Myerson and Mark A. Satterthwaite, Efficient mechanisms for bilateral trading, *Journal of Economic Theory* **29** (1983), 256–281.

* Alessandro Pavan, Ilya Segal and Juuso Toikka, Dynamic Mechanism Design: A Myersonian Approach, *Econometrica* **82** (2014), 601–653.

* Jean-Charles Rochet, A necessary and sufficient condition for rationalizability in a quasi-linear context, *Journal of Mathematical Economics* **16** (1987), 191–200.

* William Vickrey. Counterspeculation, auctions, and competitive sealed tenders, *Journal of Finance* **16** (1961), 8–37.

Academic Honesty and Related Procedures:

Attention is drawn to University policy and regulations on honesty in academic work, and to the disciplinary guidelines and procedures applicable to breaches of such policy and regulations. Details may be found at http://www.cuhk.edu.hk/policy/academichonesty/.

With each assignment, students will be required to submit a signed declaration that they are aware of these policies, regulations, guidelines and procedures.

- In the case of group projects, all students of the same group should be asked to sign the declaration, each of whom is responsible and liable to disciplinary actions should there be any plagiarized contents

in the group project, irrespective of whether he/she has signed the declaration and whether he/she has contributed directly or indirectly to the plagiarized contents.

- For assignments in the form of a computer-generated document that is principally text-based and submitted via VeriGuide, the statement, in the form of a receipt, will be issued by the system upon students' uploading of the soft copy of the assignment.

Assignments without the properly signed declaration will not be graded by teachers.

Only the final version of the assignment should be submitted via VeriGuide.

The submission of a piece of work, or a part of a piece of work, for more than one purpose (e.g. to satisfy the requirements in two different courses) without declaration to this effect, shall be regarded as having committed undeclared multiple submission. It is common and acceptable to reuse a turn of phrase or a sentence or two from one's own work; but wholesale reuse is problematic. In any case, agreement from the course teacher(s) concerned should be obtained prior to the submission of the piece of work.