

VGSF Micro(b) & CF-1(a)
Elements of Game Theory & Game Theory in Finance
Winter 2008
Syllabus

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Course Objectives:

This is an introductory course in game theory, with applications in finance. The emphasis will be on mastering basic game theory concepts. After mastering these concepts we will turn to some very rudimentary introductions of contract theory and mechanism design. These are topics that are central to the study of corporate finance and financial intermediation. At the end of this course students should have a basic foundation that will enable them to develop, solve and interpret models of strategic behavior in financial markets.

Prerequisites: VGSF Microeconomics(a), or equivalent. This course covered the first four chapters of JR (see below). Students must also be well versed in basic probability theory.

Course Materials:

Required:

1. D: Dutta, Prajit D., (1999), *Strategies and Games, Theory and Practice*.

The following book was required for Microeconomics(a). I will expect that you still have access to this book, or some other microeconomics text, such as Mas-Colell (see below):

2. JR: Jehle, Geoffrey A. and Philip J. Reny., *Advanced Microeconomic Theory*, Second edition.

The following books are also good reference books for this course:

3. Bolton, Patrick and Mathias Dewatripont, 2005, *Contract Theory*, The MIT Press.
4. Fudenberg, Drew and Jean Tirole, 1992, *Game Theory*, The MIT Press.
5. Gibbons, Robert, 1992, *Game Theory for Applied Economists*, Princeton Univ Press.
6. Krishna, Vijay, 2002, *Auction Theory*, Academic Press.
7. Mas-Colell, Andreu, Michael D. Whinston and Jerry R. Green, 1995, *Microeconomic Theory*, Oxford University Press.
8. Milgrom, Paul and John Roberts, 1992, *Economics, Organization and Management*, Prentice-Hall.
9. Myerson, Roger B., 1991, *Game theory: analysis of conflict*, Harvard University Press.
10. Osborne, Martin J. and Ariel Rubinstein, 1994, *A course in Game theory*, MIT Press.

11. Rasmussen, Eric, 1989, *Games and Information*, Blackwell.
12. Ritzberger, Klaus, 2002, *Foundations of Non-Cooperative Game Theory*, Oxford University Press.

Course Organization and Evaluation:

The main part of the course will cover game theory foundations and will consist mostly of lectures. During this part of the course I will give you problem sets to solve as homework. After the 9th or 10th regular class meeting there will be an in-class exam. The second part of the course will cover special topics in game theory that are particularly pertinent to corporate finance. Homework in this part of the course will consist of problem sets and/or preparation of presentations of articles from the literature. The final exam for the course may be either a take-home or an in-class exam.

Evaluation:

Homework: 20%

Exam 1: 30%

Final exam: 40%

Class participation: 10%

Class Schedule:

Mon, Feb 25, 11.00-12.30, SZ VI

Wed, Feb 27, 11.00-12.30, SRS

Thu, Feb 28, 09.00-10.30, SZ VI

Thu, Feb 28, 14.00-15.30, SZ VI (problem session)

Tue, Mar 04, 11.00-12.30, SZ VI

Wed, Mar 05, 11.00-12.30, SZ VI

Thu, Mar 06, 11.00-12.30, SZ VI

Thu, Mar 06, 14.00-15.30, SZ VI (problem session)

Mon, Mar 10, 11.00-12.30, SZ VI

Mon, Mar 10, 14.00-15.30, SZ VI (problem session)

Mon, Apr 28, 11.00-12.30, SZ VI

Tue, Apr 29, 11.00-12.30, HS II

Tue, Apr 29, 14.00-15.30, SZ VI

Wed, Apr 30, 11.00-12.30, SZ VI

Wed, Apr 30, 14.00-15.30, SZ VI (problem session)

Tue, May 06, 11.00-12.30, SZ VI

Wed, May 07, 11.00-12.30, SZ VI

Thu, May 08, 11.00-12.30, SZ VI

Thu, May 08, 14.00-15.30, SZ VI (16.00-17.30, HS II?) (problem session)

Tue, May 13, 11.00-12.30, SZ VI

Wed, May 14, 11.00-12.30, SZ VI

Thu, May 15, 11.00-12.30, SZ VI (problem session)

Possible additional sessions: May 14, 14.00-15.30, SZ VI and May 15, 16.00-17.30, HS II

TOPICS

PART I: Game Theory Fundamentals

(Note: The readings listed below supplement the course lectures. The lectures will at times cover material not included in the readings.)

Topic:

1. What is game theory? Overview of game theory in finance.
Representation of games.
Dominant strategies.
Dutta: Chapters 2 and 4
2. Solution concepts for static games.
Dutta: Chapters 5–6, 8, 9.2.2, 9.2.3
Additional reading: Osborne and Rubinstein, Chapter 3
3. Static games with incomplete information
Dutta: Chapters 20–21
4. Dynamic games with complete information
Dutta: Chapters 11, 13–16
5. Dynamic games with incomplete information
Gibbons: Chapter 4

PART II: Special topics and applications

The first three topics below will be covered. The extent to which we are able to cover the last two topics will depend on the speed at which we are able to cover the fundamental material.

6. Hidden actions: Moral Hazard and Principal/agent problems
Introduction to contract theory
Dutta: Chapter 19
Milgrom and Roberts (1992): pp166–192
Additional reading: Grossman and Hart (1983), Holmström (1979)
7. Hidden information: Adverse selection
Dutta: Sections 24.3, 24.4
Milgrom and Roberts (1992), pp149-153.
Akerlof (1970)
Applications in finance: Obtaining financing: Rock (1986),
Market microstructure: Milgrom and Stokey (1982)
8. Introduction to mechanism design and auctioning of securities
Dutta: Chapters 22, 23
Additional reading: Benveniste and Spindt (1989), Back and Zender (1993)
Maksimovic and Pichler (2006)
Krishna (2003): selected readings

9. Market microstructure:
Overview of issues and modelling approaches.
Batch trading model: Kyle (1985). We will probably only cover a 2-period version of this model.
Sequential trading model: Glosten and Milgrom (1985)
10. Contracts
Bolton and Dewatripont (2005): selected readings

Articles:

1. Akerlof, G., 1970, The market for lemons: qualitative uncertainty and the market mechanism, *Quarterly Journal of Economics* 89, 488–500.
2. Aumann, Robert J., 1974, “Subjectivity and correlation in randomized strategies”, *Journal of Mathematical Economics* 1, 67–96.
3. Back, K. and J. F. Zender, 1993, Auctions of divisible goods: on the rationale for the treasury experiment, *The Review of Financial Studies*, 6, 733–764.
4. Benveniste L.M. and P.A. Spindt, 1989, How investment bankers determine the offer price and allocation of new issues, *Journal of Financial Economics*, 24, 343–362.
5. Glosten, L. R., 1989, Insider Trading, Liquidity and the Role of the Monoplist Specialist, *Journal of Business* 62, 211–235.
6. Glosten, L. R. and P. R. Milgrom, 1985, Bid, Ask and Transaction Prices in a Specialist Market with Heterogeneously Informed Traders, *Journal of Financial Economics* 14, 71–100.
7. Grossman, S. J. and O. D. Hart, 1983, An analysis of the principal-agent problem, *Econometrica* 51, 7-45.
8. Holmström, B., 1979, Moral hazard and observability, *Bell Journal of Economics* 10, 74-91.
9. Kyle, A. S., 1985, Continuous auctions and insider trading, *Econometrica* 53, 1315–1335.
10. Maksimovic, V. and P. Pichler, 2005, Structuring the Initial Offering: Who to Sell To and How to Do It, working paper, IHS and University of Maryland.
11. Milgrom, P. and N. Stokey, 1982, Information, trade and common knowledge, *Journal of Economic Theory* 26, 17–27.
12. Rock, K., 1986, Why new issues are underpriced, *Journal of Financial Economics* 15, 187-212.
13. Thakor, A., 1991, Game theory in finance, *Financial Management* Spring Issue, 71–94.