



**Game Theory Applications to
Finance and Consulting Cases
Finance 750: Independent Study Project
Winter 2001**

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Course Website: <http://www.citi.umich.edu/u/galka/games>
Office Hours: Monday 10:00a.m. - 12:00p.m.
Thursday 1:00p.m. - 3:00p.m. (or by appointment).

Schedule

| Section | Day | Time | Room |
|----------------------------------|-------------|-----------------------|-------|
| 001 | Mon/ Wed | 1:00 p.m. - 2:30 p.m. | K1230 |
| Midterm: Take home Final: TBA | | | |

Course Objectives

The class is a non-technical introduction to game theoretic analysis. We will cover the major principles and methods of game theory with application to finance and consulting cases. We will study the determination of the set of relevant players, their strategies, and the set of actions they are likely to undertake (i.e. their equilibrium actions).

We will introduce a notion of Nash equilibrium, and of a subgame perfect equilibrium. We will introduce basic types of the games (Prisoners dilemma, zero-sum and non zero-sum games, etc.), which frequently occur in financial environments. We will learn how to recognize these games in real life situations, and how to choose the best-suited game to analyze a specific business case. The class targets MBA students planning careers in financial or consulting industries.

Grading and Requirements

This course will have three homework assignments, one case study a take-home midterm and a final exam. The written assignments and the midterm are due at the beginning of the class in which they are discussed. Students are encouraged to work together and turn in the written assignments, which are optimal: the homework grade could be substituted by the class participation grade¹. Write-ups could reflect the work of up to 4 students.

Good questions are purposely written to be ambiguous. While there are no right answers, there are good and bad arguments. If you are uncomfortable with ambiguity you should reconsider taking this course, or prepare to deal with the subject where ambiguity is an essential feature.

Attendance: The subject of international finance is conceptually demanding and hardly could be mastered through an independent self-study. Thus, attendance of lectures is crucial to absorb the material. Attendance and promptness will be rewarded accordingly.

| | |
|---------------------------------|------|
| Midterm exam: (Take home) | 30% |
| Final exam: (Take home?) | 40% |
| Homework / Class participation: | 30%, |

Students will have an option to re-weight the final at 70 % of the total grade (dropping off the midterm grade).

A handwritten 'cheat sheet' will be permitted on the Final exam. Also students could purchase extra exam time: its cost is 1 point reduction of their exam score per extra minute (the total score for each exam is 100, with up to 10 additional bonus points). No make-ups will be allowed, except with a formal excuse from the Academic Services Office.

Grade Appeals: Grade appeals are in writing only, and have to be submitted within 5 days after the date when the written work is returned.

Prerequisites: BE 501 (can be taken concurrently). Background in game theory is not required. *Ability to think is not required, but is highly desirable.*

How to enroll (and get credit): The course does not have the number. The course number will be designated if academic services will require. Independent study project gives you the same credit as one seven-week course, which is 1.5 credit hours.

Readings: The primary readings will come from an excellent textbook): Dixit, A. and Skeath, S., (1999), *Games of Strategy* (further **Dixit**). Lecture notes and relevant excerpts from various publications will supplement the textbook. Cases will be drawn mostly from Lewis, Michael, (1990), *Liar's Poker* (further **Lewis**). Some readings will be posted as pdf files. Thus, students will need Adobe

¹ That is, 30% of a student's grade will be determined by *either* the student's homework or class participation grade – whichever is higher.

Acrobat Reader (see www.adobe.com/prodindex/acrobat/readstep.html). In order to disseminate the class materials efficiently, it is advisable to check the web site in advance (i.e. within 24 hrs) of each class. Most course materials will be distributed in class and posted on course web site, and linked to my home page at <http://www.citi.umich.edu/u/galka/games>

Introduction. Course Overview. Subject and Structure of the Course [1 Lecture]

Terminology and Background Assumptions [1 Lecture]

Classification of the Games Examples of the Games [1.5 Lectures]

Complete and Incomplete Information games, Repeated and Non-repeated Games, Games with Simultaneous Moves and Games with Sequential Moves,

Prisoner's Dilemma, Coordination Game (Battle of Sexes), Zero-sum (and Constant Sum) games,

Dixit, Chapters 1 & 2, (R).

Levis, Chapter 1, (R).

Games with Sequential Moves [1 Lecture]

Games with Simultaneous Moves [1 Lecture]

Dixit, Chapters 3 & 4, (R).

Levis, Chapter 3 & 4, (R).

Super Games (Infinitely Repeated Games) [1 Lecture]

Equilibrium Derivation for Infinitely Repeated Prisoner's Dilemma, Discount Factor Interpretation as Probability of Repetition, Examples: Cartel Sustainability

Game Theoretic Experiments [1 Lecture]

Evidence: Divide a Dollar Game, Centipede Game, Explanation of Cross-Country Differences, Social Norm

Mixed Strategy Equilibrium [1 Lecture]

Dixit, Chapter 5, [parts] (R).

Notion of the Subgame-Perfect Equilibrium [0.5 Lecture]

Credibility of the Threats

Dixit, Chapter 6, [parts] (R).

Bargaining Theory [2 Lectures]

Ultimatum game, surplus of the game, Rubinstain Bargaining Model (Alternating Offers Model), delay, impatience, outside option, manipulating information, Example

Dixit, Chapter 16, (R).

Auction Theory; Conclusions & Course Summary [2 Lectures]

Types of Auctions, English (ascending), Dutch (descending), First Price, Second Price, Common Value (Objective Value), Private Value (Subjective Value), Auction design, Winner's Curse, Vickrey's Truth Serum, Revenue Equivalence Theorem, Bid Shading, All-Pay Auctions, Risk-Neutral and Risk-Averse Bidders, Independent Estimates and Correlated Estimates, Information Disclosure, Auction Design, Examples

Dixit, Chapter 15, (R).

References

Main Textbook: Dixit, A. and Skeath, S. (1999), *Games of Strategy*

Dutta, P, (2000), *Strategies and Games: Theory And Practice*

Fudenberg D., and Tirole, J., (1993), *Game theory*. MIT Press.

Osborn and Rubinstein, A., (1990), *Bargaining and Markets*, MIT Press.

Cases are drawn mostly from:

Lewis, Michael, (1990) *Liar's Poker: Rising Through the Wreckage on Wall Street*, Penguin USA.

Lewis, Michael, (1995), *The Money Culture*, Penguin USA.

Dixit, A. (Princeton University) and Nalebuff, B (Yale University), *Thinking Strategically: The Competitive Edge in Business, Politics, and Everyday Life*,

and from current publications, such as WSJ, NY Times and Economist.