MGRECON 402: Game Theory for Strategic Advantage

LOGISTICS

Professor: David McAdams
Offered: Spring 2011, Term 1
Time: Tuesday/Friday, 1030AM and 130PM
Location: 2008 MBA Classroom, Fuqua

OVERVIEW

People rarely make decisions in a vacuum. The choices we make affect others, and their choices impact us. Such situations are known as “games” and game-playing, while sounding whimsical, is serious business. Managers frequently play games both within the firm with other divisions and subordinates, etc. as well as outside the firm with competitors, customers, regulators, and even capital markets! The goal of this course is to enhance your ability to think strategically in complex, interactive environments. Knowledge of game theory will give you an advantage in such strategic settings.

The course is structured around three “themes for acquiring advantage in games”:

1. **Limited rationality**: How to play when others may not be fully rational, and when others are uncertain about your rationality.
2. **Commitment / strategic moves**: Credibility, threats, and promises as ways to change the game being played.
3. **Exploiting hidden information**: When to reveal information or not, including when to surprise an opponent. Adverse selection as a strategic force.

Specific issues that arise in business strategy will act as motivation, but this is not a course about business tactics. For instance, you will not necessarily become a better trader or a better negotiator. Rather the goal is to provide you with a deeper understanding of key issues that arise in a wide variety of strategic situations.

As a core discipline of economics, game theory is applied in many other courses offered at Fuqua. We will discuss a wide variety of these examples, but this course is designed primarily to provide you with deeper intuitions and a framework for thinking about

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1 Office: Fuqua A416 Phone: 660-7926 E-mail: david.mcadams@duke.edu
2 These applications are wide-ranging: games played between rival firms in competitive analysis; games played between firms and their suppliers and between managers and their employees in strategy; not to mention applications in negotiations, international macroeconomics, corporate finance, etc…
interactive strategic settings. While the course is designed to complement Fuqua’s other economics and strategy offerings, it is self-contained. There are no prerequisites beyond the Core economics course.

My view is that the important ideas of game theory are best mastered not at the level of some abstract theory but through the flesh and blood of real examples. For this reason, we will discuss numerous real-world examples and analyze games that arise in business settings. Indeed, the most important element of the course is a team project in which students will identify a real-world game of interest, analyze it using the tools of the course, and offer concrete strategic advice to some player in the game.

In the same spirit, my goal is to teach game theory, not mathematics. Actually, students will discover a fascinating paradox: the more transparent the mathematics, the more interesting and challenging the issues that can arise. For example, in the other microeconomics courses offered at Fuqua, students learn how to calculate the Nash equilibria of a given game, but such mathematical analysis is not in itself very illuminating. We will of course use reaction curves and such as tools but only ultimately to get to ideas that are mathematics-free. So when someone asks you a simple question without all of the equations and curves (say “Should we pursue a cost-reducing innovation that will ultimately lower both our costs and our competitors?”) you will have a ready understanding of the key strategic issues involved.

**READINGS**

**Required textbook.**


**Readings on the web.** Most readings will be available (free of charge) via links to the Ford Library’s holdings on the course webpage.

**Coursepack.** You are required to purchase a course-pack. Among other things, the course-pack will include handouts for many of the games to be played in class.

**GRADES**

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<th>Component</th>
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<tr>
<td>Participation</td>
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<tr>
<td>Strategy Memo</td>
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<tr>
<td>Quizzes</td>
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<td>Final Project</td>
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**AUDITORS / LISTENERS**

There will be no auditors or listeners.
PARTICIPATION

The participation grade is based on several factors. In particular, your participation grade will be outstanding if you can answer “Yes” to all of the following questions.

- Have you shown respect to your classmates, by (i) refraining from rude or insulting comments, (ii) arriving on time, etc?
- Have you played all of the online games and participated in both of the online tournaments?
- For each of the in-class games, did you treat the worksheet assignment seriously enough to provide thoughtful answers (not just “I would do X” but a coherent explanation for your choice)?
- Have you made meaningful contributions to the online discussion board?

There are additional factors – extra credit based on your performance in the tournaments, or in certain games to be played in class – as well as a qualitative assessment on my part of your overall contribution to the class dynamic. (Your grade will NOT depend on how many times you speak during class.)

GAMES

ONLINE GAMES: Prior to several of the lectures, students will play an online game. Preparation is unnecessary. Most games require about 5-15 minutes to play. Full participation credit will be given for playing the game, regardless of your “score”. (However, results will be announced in class.)

LOGISTICS OF ONLINE GAMES: Online games will be available from the course website as surveys. Games will become available on the day of the lecture in which they are announced and must be played by 5:00 PM the day prior to the next lecture.

IN-CLASS GAMES: In most of the lectures, we will play a game in class that requires preparation before class. This will involve reading and completing a 1-2 page worksheet. Full participation credit will be given for a thoughtfully completed worksheet (given to the TA at or before the beginning of class), regardless of whether your reasoning is correct.

TOURNAMENTS: You will submit a strategy and a robot will play that strategy on your behalf in two computerized tournaments (“Bluffing Madness” and “Angry Madness”). Full participation credit will be given for submitting a strategy. The top three finishers – Gold, Silver, Bronze – will get extra credit as well.
QUIZZES

Quizzes are open notes and occur at the beginning of class. Sample questions with solutions will be provided. Quiz problems will be very similar to sample questions. Your overall quiz-grade will be based on your best two out of three quizzes.

FINAL PROJECT

Provide strategic advice to a player of a “real-world” game. (You need not gather actual data. It suffices to consider a hypothetical scenario that could be real.)

Deliverable: memo of any length\(^3\) -- the best memos are often fairly brief -- addressed to the relevant party in the game, as well as an appendix addressed to Professor McAdams that contains supporting analysis.

Examples of excellent past projects are available on the course website.

Collaborating with the Professor is encouraged:

This is the most important element of the course. As such, you should begin thinking about your final project as early as possible. In particular, during the middle of the course, I will be available for collaborative “brainstorming sessions” to talk with you and your team about your ideas. (These sessions are not required.) Coming to these sessions, you should have an idea of a game (or two) you’d like to study. I can then work with you to explore ways to make that game as interesting and “juicy” as possible from a game theory perspective.

Please do not be shy about approaching me regarding your final project. Interacting with you as you work on your final project is the most satisfying part of the course for me.

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\(^3\) The most successful memos will clearly convey the “bottom line” of your motivation, assumptions, analysis, and conclusions to the relevant player. As long as it is effective and helpful to this player, it may be short or long. The very best projects will, as appropriate, include a careful, correct, and creative application of game theoretic ideas and techniques in the appendix.