

Grinnell College
Economics 295
Spring 2005

Bill Ferguson
Carnegie 205
X3132
Ferguso1@grinnell.edu

Office Hours: Tues, Thurs 10 – 12 and by appointment

Syllabus: Game Theory

Game theory offers a set of tools used to formally conceptualize and model strategic interaction among independent agents who share awareness of their interdependence. As such it offers analytical foundations for a broad range of interactions and relationships investigated by disciplines ranging from biology to economics and political science. This course will develop fundamentals of game theoretic modeling using visual representation (diagrams, graphs and game matrices) along with solving equations, with an emphasis on intuitive technique and direct application to examples primarily from economics, politics, and political economy.

Readings

Avinash Dixit and Susan Skeath, *Games of Strategy*, Second Edition, New York and London: W.W. Norton, 2004.

Avinash Dixit and Barry Nalebuff, *Thinking Strategically: The Competitive Edge in Business, Politics, and Everyday Life*, New York and London: W.W. Norton, 1991.

Robert Gibbons, *Game Theory for Applied Economists*, Princeton, N.J.: Princeton University Press, 1992.

Dixit and Skeath (hereafter D&S) is the key text for this course. Dixit and Nalebuff (hereafter D&N) offers an informal discussion of many game theoretic principles, stressing stories and applications. Gibbons offers a more formal treatment focused on economics. All three are required.

Evaluation:

There will be two mid-term exams and one final exam. The mid-terms will count as $\frac{1}{2}$ of the final. There will be a student project (written paper) which will count as one exam. These jointly will constitute about 75% of the grade. Students will give periodic oral presentations, including a formal presentation of their final project. Oral presentations, class participation, *including attendance*, and about 9 problem sets will count for approximately 25% of the grade.

Course Outline -- Preliminary Schedule

I. Conceptualizing Strategic Interdependent Behavior – Jan. 24 and 26

D&S Chapters 1 & 2; D&N Chapter 1.

II. Foundations of Game Theory: Sequential and Simultaneous Games

A. Basic Concepts: Jan. 28 and week 2

Sequential games with complete information:

D&S Chapter 3; D&N Chapter 2; Gibbons, 2.1A

Simultaneous games with discrete pure strategies:

D&S Chapter 4; D&N, Chapter 3; Gibbons, through 1.1

B. Elaborations and Complications of Basic Games: weeks 3 - 5

Continuous strategies:

D&S Chapter 5; Gibbons, 1.2A, 1.2B, 2.1B

Combining sequential and simultaneous games:

D&S chapter 6; Gibbons, 2.4

Mixed strategies:

D&S chapters 7 and 8; D&N chapter 7; Gibbons, 1.3A

First Hour Exam

III. Important Categories of Games: dimensions of information, strategy, social well being and evolutionary dynamics

This section develops four broad categories of games which offer key modeling tools relevant to economics, political science, political economy, and other areas of inquiry, such as evolutionary biology.

A. Strategizing in the Face of Imperfect and Asymmetric Information: week 6

Asymmetric information theory underlies many current developments in economic theory and political economy, including contracting theory, incentive compatibility and enforcement. This section addresses questions such as: how much private information will strategic players reveal? When will they choose deception? How can players interpret signals from others and screen for reliable information?

D&S chapter 9; Gibbons selections from chapters 3 and 4.

B. Strategic Moves and Credibility: week 7

When possible outcomes of a game are relatively predictable, players can sometimes create a pre-game to alter outcomes to their advantage. To do so, they may engage in commitments, threats or promises, but to be effective, such moves need to be credible.

D&S chapter 10; D&N, chapters 5 and 6; Gibbons, 2.4

C. The Prisoner's Dilemma and Collective Action Problems : week 8

What is missing from the policy analyst's tool kit – and from the set of accepted, well-developed theories of human organization – is an adequately specified theory of collective action whereby a group of principals can organize themselves voluntarily to retain the residuals of their own effort. – Elinor Ostrom

D&S chapters 11 and 12; D&N, chapter 9; Gibbons, 1.2D and 2.3

D. Evolutionary Games: week 9

Darwinian competition and cooperation offer a foundation for game theoretic analysis which does not require the conceptual abilities which underlie rational calculation, yet it generates, and sometimes strengthens and refines, key game theoretic results from rational calculation. Evolutionary game theory may be applied not only to biology, but also to many social, political and economic interactions where strategies are transmitted among players through various cultural mechanisms, such as education. Successful strategies are more likely to reproduce themselves than unsuccessful strategies, leading to a process of evolution.

D&S, chapter 13

Second Hour Exam

IV. Cases and Applications: Remaining Weeks

Brinkmanship: D&S, chapter 14

Voting Strategy: D&S, chapter 15

Auctions and Bidding: D&S, chapter 16

Bargaining: D&S, chapter 17

Markets and Competition: D&S, chapter 18

Students will develop projects based on the application of concepts in at least one of these chapters to real-world situations.

FINAL EXAM: Thursday, May 19, 9:00 a.m. Plan accordingly!