

**Introduction to Game Theory**  
**ECON 4750 - 010 (CRN 54211)**

**Summer 2017**

*It should be noted that this course syllabus provides a general plan for the course and deviations may be necessary.*

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1. Allow a reasonable amount of time for the instructor to reply to your emails. That is, 24 hours for weekdays and 48 hours for weekends.
2. Please use your PantherMail [@student.gsu.edu](mailto:@student.gsu.edu). Emails concerning this class will be sent to your PantherMail address, please check regularly.

**Office Hours:** Wednesday 11:30 pm – 2:00 pm. Other times by appointment.

**Class meets on Mon and Wed from 4:45PM to 7:15PM in Langdale Hall 421**

**Textbook**<sup>1</sup>: A. Dixit, S. Skeath and D. Reiley, *Games of Strategy*, 3<sup>rd</sup> or 4<sup>th</sup> edition, W.W. Norton & Company: New York.

**Prerequisites:** There is no prerequisite for this course. But students should be comfortable with mathematical notation and formal reasoning.

**Important Dates:**

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| June 9  | Last Day to add/drop classes   |
| June 26 | First Midterm (4:45-6:00 pm, in-class)   |
| June 30 | Last day to Withdraw ( <a href="http://www.gsu.edu/registrar/withdrawals.html">www.gsu.edu/registrar/withdrawals.html</a> for details) |
| July 4  | Independence Day (University Official Holiday-no classes)  |
| July 13 | Second Midterm (4:45-6:00 pm, in-class)  |
| July 16 | Project due at mid-night (no late submissions)   |
| July 19 | Last day of lectures   |
| July 27 | Final Exam (4:15- 6:45pm, in class)  |

**Statement on Academic Honesty:** Students are expected to abide by GSU's policy on academic honesty, which is published in the student handbook. A portion of this policy follows:

“...As members of the academic community, students are expected to recognize and uphold

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<sup>1</sup> Solutions to some exercises in the book can be found on the following site:

<http://books.wwnorton.com/books/978-0-393-93112-9/>. Also, check out the link (<http://www.gametheory.net/students.html>) which contains many interesting stuff from lecture notes, dictionary, quizzes and tests to game theory in movies and music, and in news.

standards of intellectual and academic integrity. The University assumes as a basic and minimum standard of conduct in academic matters that students be honest and that they submit for credit only products of their own efforts... The student is responsible for understanding the legitimate use of resources; the appropriate ways of acknowledging academic, scholarly, or creative indebtedness; and the consequences of violating this responsibility”

**Evaluation:** Grading will be based on homework assignments (check Desire2Learn regularly for homework), pop quizzes, course participation, two midterms, one group project (report and presentation) and one final examination (comprehensive) with the following weights:

- Homework Assignments [15%]: Each HW is evaluated on a scale from 1 to 15; the average of HW grades (excluding one lowest grade) will be added towards the final grade.
- Midterm Exam [30%]: The higher grade of the 2 midterms accounts for 30% of the final grade.
- Group Project [15%]: Please see the separate instruction for requirements and grading.
- Final Exam [40%]: The in-class, comprehensive final exam accounts for 40% of the final grade.
- *Extra credits [≤7%]: In-class pop quizzes, class participation, etc.*

A letter grade of the following: A+, A, A-, B+, B, B-, C+, C, C-, D and F, will be assigned to you on the basis of your cumulative score. See the converting table below.

A+: 97%-100%	A: 93%-96%	A-: 90%-92%
B+: 87%-89%	B: 83%-86%	B-: 80%-82%
C+: 77%-79%	C: 73%-76%	C-: 70%-72%
D: 60%-69%	F: 0%-59%	

**Course Policies:** Regular attendance is expected and roll will be taken. Please sign in on the class roll at the beginning of every class. No late homework will be accepted; no make-up exams will be offered. Extenuating circumstances will be handled on an individual basis (absences, illness, emergencies, etc.).

**-A note on attendance policy:** There will be unannounced pop-quizzes in class on an irregular basis. The quizzes may be held at any time during a class session, and usually takes 5 to 10 minutes. If you arrive late or leave early, you might miss them. There will be no make-up quizzes, even if you have a valid reason for missing (or being late for, or leaving early from) the class. The quizzes are opportunities for you to earn extra credits. While I understand that you may need to miss a class, notifying me ahead of time will not impact the quiz policy in any way.

**-A note on electronic devices:** You are not allowed to use any electronic device (computers, laptops, netbooks, e-readers, iPads, cell phones—text messaging or voice, beepers, pagers, e-readers, “iPhone-blackberry” type connections, recording devices, etc.) during the scheduled class period.

Accessing the reading material in electronic format is not a valid excuse to use your electronic device during the class. Answering work related phone calls will be allowed, provided it is done in a non-disruptive manner. For all other cases, if you use an electronic device, or if your electronic device “goes off” during the class, you might be asked to leave that specific class and be treated as absent for the total class, thereby losing any credit earned in that class period.

**Course Description and Objectives:** Game theory, also known as multi-person decision theory, analyzes situations in which payoffs to players depend on the behavior of other players as well as the player himself/herself. Game theory has found many applications in various fields, such as economics, biology, business, law, politics, sociology, and computer science. The purpose of this course is to introduce the basics of game theory to undergraduate students in various disciplines. It focuses on fundamentals of game theory including basic concepts and techniques, various ways of describing and solving games, and various applications in economics, political sciences, and business. It will help students sharpen their understanding of strategic behavior in different situations involving many individuals. The students will learn how to recognize and model strategic situations, to predict when and how their action will have an influence on others, and to exploit strategic situations for the benefit of their own.

**Learning Outcomes:** Students should be able to:

- (1) Distinguish a game situation from a pure individual's decision problem,
- (2) Explain concepts of players, strategies, payoffs, rationality, equilibrium,
- (3) Describe sequential games using game trees, and to use the backward induction to solve such games,
- (4) Describe simple simultaneous-move games using game tables, and to explain concepts of dominant, dominated, and rationalizable strategies, pure and mixed strategies, and best responses,
- (5) Find dominant strategy equilibrium, pure and mixed strategy Nash equilibrium,
- (6) Describe simple games involving both sequential- and simultaneous-moves, and to explain and to find sub-game perfect Nash equilibrium,
- (7) Explain concepts of asymmetric information, and to analyze simple signaling games,
- (8) Analyze repeated games, and to explain the folk-theorem.

**Course Outline:** The following is a rough outline and subject to changes.

Week 1                      Introduction (Chapters 1 and 2)

- Jun. 5, 7                      (a) Games, Strategies and Examples  
                                    (b) Decisions and Types of Games  
                                    (c) Descriptions of a Game and Its Assumptions

Sequential Games (Chapter 3)

- (a) Game Trees  
(b) Solving Games  
(c) Some Complications

Week 2                      Simultaneous-Move Games I: Discrete Strategies (Chapter 4)

- Jun. 12, 14                      (a) Describing a simultaneous-move game  
                                    (b) Dominant and Dominated Strategies  
                                    (c) Best Response and Nash Equilibrium  
                                    (d) Games with Three Players  
                                    (e) Multiple Equilibria and Existence of Pure-Strategy Equilibrium

Simultaneous-Move Games II: Continuous Strategies (Chapter 5)

- (a) Pure Strategies  
(b) Nash Equilibrium: Some Further Discussions  
(c) Rationalizability

Week 3                      Combining Sequential and Simultaneous Moves (Chapter 6)

- Jun. 19, 21                      (a) Multistage Games and Sub-games  
                                    (b) The Order of Moves

Simultaneous-Move Games III: Mixed Strategies (Chapters 7,8 in 3<sup>rd</sup>; Chapter 7 in 4<sup>th</sup> )

- (a) Mixed Strategies  
(b) Probabilities and Expected Utility and Risk Attitudes  
(c) Best-Responses and Nash Equilibrium in Mixed Strategies  
(d) Average-Payoff Analysis and Nash Equilibrium in Mixed Strategies

Week 4	<b>Midterm Test I (Jun. 26 4:45-6:00pm, in class, closed book, closed notes)</b>
Jun. 26, 28	Uncertainty and Information (Chapter 9) <ul style="list-style-type: none"> <li>(a) Asymmetric Information</li> <li>(b) Cheap Talk</li> </ul> (c) Adverse Selection, Signaling and Screening <ul style="list-style-type: none"> <li>(d) Equilibrium in Signaling Games</li> </ul> Strategic Moves (Chapter 10) <ul style="list-style-type: none"> <li>(a) Types of Strategic Moves</li> <li>(b) Credibility and Commitments</li> <li>(c) Promises and Threats</li> </ul>
Week 5	Repeated Games (Chapter 11)
Jul. 3,5	(a) The Prisoners' Dilemma <ul style="list-style-type: none"> <li>(b) Repetition</li> </ul> Collective-Action Games (Chapter 12) <ul style="list-style-type: none"> <li>(a) Two Players vs Large Groups</li> <li>(b) Solving the Games</li> <li>(c) Externalities</li> </ul> Evolutionary Games (Chapter 13) <ul style="list-style-type: none"> <li>(a) Description and Examples</li> <li>(b) Cooperation and Altruism</li> </ul>
Week 6	<b>Midterm Test II (Jul. 10 4:45-6:00pm, in class, closed book, closed notes)</b>
Jul. 10,12	Mechanism Design (Chapters 14) <ul style="list-style-type: none"> <li>(a) Basic Ideas and Examples</li> <li>(b) Some Applications</li> </ul> Auctions (Chapter 17) <ul style="list-style-type: none"> <li>(a) Types of Auctions</li> <li>(b) Bidding Strategies</li> </ul>
Week 7	<b>Project Due: Jul. 17</b>
Jul. 17,19	Group Presentation <ul style="list-style-type: none"> <li>Review (Jul. 19)</li> <li>If required an additional review session on Jul. 24</li> </ul>

**July 26 Final Exam (4:15-6:45pm, in class, open book, open notes)**