

Game Theory and Applications

ECO 4400 Section: 0150

Class Periods: Tuesday/Thursday, Periods 3-4, 9:35-11:40

Location: Matherly ?

Academic Term: Fall 2020

Instructor:

Professor Daniel Wagner

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352.294.0989

Office Hours: T R 1-2pm

Course Description

Introduces modern game theory, including the formal theory of Nash equilibrium and solutions techniques.

Applications include strategic barriers of entry; cooperative behavior in oligopoly, auctions and bidding strategies; and durable goods sales.

4 credits

Course Pre-Requisites

Intermediate Microeconomics(ECO 3101) and Calculus I(MAC 2311) or equivalents

Course Objectives

Analyze and model strategic decision making by rational actors under perfect and imperfect information, study industrial organization and pricing decisions in a more mathematically rigorous context and conclude with longer games and decisions under uncertainty.

Required Textbook

- Games, Strategies, and Decision Making
- Joseph E. Harrington Jr.
- 2015, 2009, 2nd Edition
- ISBN number: 978-1-4292-3996-7

Recommended Materials

- Partial Derivatives- Khan Academy Review
<https://www.khanacademy.org/math/multivariable-calculus/multivariable-derivatives/partial-derivatives/v/partial-derivatives-introduction>
- Dixit, Skeath, and McAdams- textbook used in other Game Theory section

Module 1: Introduction to Game Theory

This module provides an introduction to Game Theory and develops concepts that will be used through the rest of the course. We study how equilibrium is achieved in simultaneous and sequential move games with 2 players, allowing modeling of topics such as firm duopolies and the Cold War, and setting the stage for more complex games.

Week 1: Simultaneous Move Games and Strict Dominance *August 31 – September 4*

- Read: Harrington Chapter 1 and 2 for Tuesday, 3 for Thursday
 - Optional reading- Dixit, Skeath, McAdams: Chapter 1 and 2
- Syllabus Quiz Thursday

Week 2: Nash Equilibrium and Best Responses *September 7 – September 11*

- Read: Harrington Chapter 4, up to part 4.5 for Tuesday, remainder for Thursday
 - Dixit Chapter 4
- Problem Set 1 given Thursday, due next Thursday
- Quiz 1 Thursday

Week 3: Sequential Move Games and Subgame Perfection *September 14 – September 18*

- Read: Harrington Chapter 8 to 8.4 Tuesday, remainder Thursday
 - Dixit Chapter 3
- Problem Set 1 due Thursday

Week 4: Relationship between Normal Form and Extensive Form *September 21 – September 25*

- Read: Review Harrington Chapter 8 and 2
 - Dixit Chapter 6
- Quiz 2 Thursday
- Problem Set 2 Given Thursday, Due next Tuesday

Week 5: Exam 1 *September 28 – October 2*

- Problem Set 2 due Tuesday
 - Review Session Tuesday in class, extra office hours Wednesday
 - Exam 1 Thursday
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Module 2: Mixed Strategies, Continuous Strategies, and Repeated Games

This module introduces mixed and continuous strategies before moving on to repeated games, building on the framework from the previous module with a wider range of moves available to players and bringing in calculus.

Week 1: Mixed Strategies *October 5 – October 9*

- Read: Harrington Chapter 7, Through 7.3 for Tuesday, Remainder Thursday
 - Dixit Chapter 7
- Problem Set 3 given Thursday
- Quiz 3 Thursday

Week 2: Continuous Strategies 1 *October 12 – October 16*

- Read: Harrington Chapter 6, part 6.1 and 6.2 for Tuesday, and 6.3 for Thursday
 - Review Derivatives and Partial Derivatives on Khan Academy
 - Dixit Chapter 5
- Problem Set 3 due Thursday

Week 3: Continuous Strategies 2 *October 19 – October 23*

- Read: Harrington Chapter 6
 - Dixit Chapter 5

- Problem Set 4 given Thursday, due next Thursday
- Quiz 4 Thursday

Week 4: Repeated Games *October 26 – October 30*

- Read: Harrington Chapter 13 for Tuesday and 14 for Thursday
- Problem Set 4 due Thursday

Week 5: Exam 2 *November 2 – November 6*

- Review Session Tuesday
- Extra Office Hours Wednesday
- Exam 2 Thursday

Module 3: Incomplete Information and Applications

This module introduces games with incomplete information, and applications of Game Theory to more complex real world examples and other disciplines. We study Perfect Bayesian Nash Equilibrium in Signaling Games and auctions. For more complex real world games we will study N-Player Games, Collective Action Games, and more complex strategic scenarios such as durable goods.

Week 1: Bayesian Games *November 9 – November 13*

November 11 IS A HOLIDAY (VETERANS DAY)

- Read: Harrington Chapter 9, up to 9.4 for Tuesday, Remainder for Thursday
 - Dixit Chapter 8 and 9
- Problem Set 5 given Thursday, due next Thursday
- Quiz 5 Thursday

Week 2: Signaling *November 16 – November 20*

- Read: Harrington Chapter 10, up to 10.4 for Tuesday, Remainder for Thursday
- Problem Set 5 due Thursday

Week 3: N Player Games *November 23 – November 27*

NOVEMBER 25-27 IS A HOLIDAY (THANKSGIVING BREAK)

- Read: Harrington Chapter 5 for Tuesday
- Problem Set 6 given Thursday, due next Thursday
- Quiz 6 Tuesday due to break

Week 4: Finish N Player Games, Durable Goods *November 30 – December 4*

- Read: Harrington Chapter 5
- Problem Set 6 Due Thursday

Week 5: Final Review Session *December 7 – December 11*

DECEMBER 9 IS THE LAST DAY OF CLASS. DECEMBER 10 AND 11 ARE READING DAYS.

- Review Session Tuesday
- Final Exam in assigned time slot, 5:30-7:30 December 16

Attendance Policy, Class Expectations, and Make-Up Policy

While not graded, attendance is required. You are responsible for the material covered in lecture. A pattern I have noticed over 4 years as a TA and then a teacher is that students who attend class regularly and complete all problem sets and quizzes comfortably get an A or a B, while failure to complete material is correlated with poor exam performance.

Late work will be accepted at a letter grade penalty per day. Work without a name will receive a one letter grade penalty, but this should not be an issue with all assignments submitted via Canvas.

- The problem sets, readings, and quizzes are intended to prepare you for the exams. Similarly to Intermediate Microeconomics this course involves intuition that can be difficult to grasp; practice is key. The course is designed with the assumption that you are practicing examples of the material, if you do not complete the quizzes and problem sets you will not be prepared for the exams.
- Problem sets are due at the beginning of class on Canvas and students will be selected at random without replacement to present solutions. I will assist you if you are unsure of the answer but presenting answers is not optional.
- Quizzes are on alternate weeks to the problem sets, first individually and then a second time with groups. This is intended to encourage study groups but both quizzes will count; you are responsible for the materials in the lectures and readings. Your lowest quiz grade will be dropped.
- While collaboration on problem sets and group quizzes is allowed this is again intended as a study tool; your classmates are a valuable resource but if you do not work through the problems yourself it is easy to falsely think you understand the material.
- Exams will be taken using Honorlock, they are not open book but a non-graphing calculator is allowed.

Laptops are not recommended for note taking as course notes will heavily rely on diagrams that are easier to draw by hand. Quizzes on Canvas can be taken on laptops or smartphones with a web browser or the Canvas application.

Excused absences must be consistent with university policies in the Undergraduate Catalog and require appropriate documentation. Please notify me in advance if you will be absent during a quiz or exam or when a problem set is due if at all possible. Additional information can be found here:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Evaluation of Grades

Assignment	Percentage of Final Grade
Problem Sets	20%
Quizzes	14%
Midterm Exam 1	22%
Midterm Exam 2	22%
Final Exam	22%

	100%
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Grading Policy

Percent	Grade	Grade Points
90.0 - 100.0	A	4.00
87.0 - 89.99	B+	3.33
80.0 - 86.99	B	3.00
77.0 - 79.99	C+	2.33
70.0 - 76.99	C	2.00
67.0 - 69.99	D+	1.33
60.0 - 66.99	D	1.00
0 - 59.9	E	0.00

Grades will not be rounded, an 89.99 is a B+. A curve will be implemented on exams only if the class average is below 70. The homework and quizzes are intended as a buffer in addition to preparing you for the exams.

Substitute work will not be offered. If an assignment without a name can be identified, it will be accepted at a letter grade penalty. If ownership is disputed and cannot be identified it will not be accepted.

Makeup exams must be prearranged and only for UF approved conflicts.

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

In the interests of fairness I will not deviate from the syllabus.

Email

Most of our one-on-one communication will occur via email. There are two important course policies regarding email:

- 1) I expect that you are reading your email at least once per day, and
- 2) All emails that you send must follow basic rules for professional correspondence. If you are unsure of what constitutes professionalism, feel free to ask or simply err on the side of caution.

Students Requiring Accommodations

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

Present your accommodation letter to me as early in the semester as possible to allow time for accommodations to be arranged.

Course Evaluation

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

University Honesty Policy

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

If you or a friend is in distress, please contact umatter@ufl.edu or 352 392-1575 so that a team member can reach out to the student.

Counseling and Wellness Center: <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.
<https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.
<https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.
<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.

Honorlock will proctor your exams this semester. Honorlock is an online proctoring service that allows you to take your exam from the comfort of your home. You DO NOT need to create an account, download software or schedule an appointment in advance. Honorlock is available 24/7 and all that is needed is a computer, a working webcam, and a stable Internet connection.

To get started, you will need Google Chrome and to download the Honorlock Chrome Extension. You can download the extension at www.honorlock.com/extension/install

When you are ready to test, log into Canvas, go to your course, and click on your exam. Clicking "Launch Proctoring" will begin the Honorlock authentication process, where you will take a picture of yourself, show your ID, and complete a scan of your room. Honorlock will be recording your exam session by webcam as well as recording your screen. Honorlock also has an integrity algorithm that can detect search-engine use, so please do not attempt to search for answers, even if it's on a secondary device.

Good luck! Honorlock support is available 24/7/365. If you encounter any issues, you may contact them by live chat, phone (855-828-4004), and/or email (support@honorlock.com).