

# **ECO 7404: Game Theory for Economists**

## **INSTRUCTOR**

Dr. Thomas Knight

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## **CLASS MEETINGS AND OFFICE HOURS**

We will meet for synchronous virtual sessions each Monday and Wednesday, 9:35-11:30am. The Zoom link for these meetings is: <https://ufl.zoom.us/j/97080818226>

I will hold virtual office hours each Wednesday afternoon, 4:00-5:00pm. The Zoom link for virtual office hours is: <https://ufl.zoom.us/j/97080818226>

## **REQUIRED AND SUGGESTED MATERIALS:**

- Required: Martin Osborne, *An Introduction to Game Theory* (Oxford University Press; ISBN: 978-0195128956)
- Recommended: Joseph Harrington, *Games, Strategies, and Decision Making, 2<sup>nd</sup> Ed.* (Worth Publishers; ISBN: 978-1429239967)

## **COURSE DESCRIPTION**

This is a half-semester, introductory doctoral course in noncooperative game theory. This course will be taught through the lens of economics, from which all of the applications and examples draw. We will begin by defining the concept of Nash Equilibrium and identifying equilibria in simple setting characterized by discrete strategies and perfect information. We will then consider mixed strategies, subgame perfection (i.e., sequential play), stage games, and Bayesian games.

It is assumed that you are comfortable with differentiation and have experience taking partial derivatives. If this is not the case, please speak to me before the end of the Drop/Add period.

## **CORE REQUIREMENTS**

1. Continued enrollment in this course is equivalent to acceptance of all stated responsibilities, policies, and due dates. If there is anything that is unclear, talk to me *immediately*. Waiting until the end of the term often results in less favorable outcomes.
2. Students are expected to attend all synchronous virtual class meetings and participate actively. I encourage you to ask questions during these lectures to make the classroom environment as interactive and engaging as possible.
3. Students are expected to complete five analytic problem sets. These problem sets relate to the topics of the preceding lectures, are intended to offer you practice with the relevant solution techniques, and should help prepare you for the final exam.
4. There is a cumulative final exam that is required for successful completion of this course. This exam is an online, closed-book exam, and is to be taken individually. As the course progresses, I will explain the structure and composition of the exam.

## **CLASS MEETINGS**

We will have two synchronous class meetings per week, which will take place each Monday and Wednesday, 9:35-11:30am (Eastern Standard Time). These class meetings will be held in the Zoom virtual meeting platform; links are posted in the Weekly Course Schedule in the Canvas course site. Lectures will be recorded, but these recordings will only be made available with documentation of an excused absence. If you are absent, you must self-study the material and share notes with your classmates. I will, of course, answer questions during office hours, but only after you have thoroughly reviewed any missed material.

All lectures will be video recorded. These recordings will be posted in Canvas and remain available until the end of the course. This practice is intended to accommodate any technical issues that may arise with streaming classes, as well as any necessary absences. It also allows you to revisit the lectures when studying for the final exam.

Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate verbally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared.

As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

## **COURSE COMMUNICATIONS**

Announcements concerning the class will typically be made during class meetings and by email. You are responsible for all information made available through both of these avenues of communication. It is assumed that you are attending each lecture, and that you are regularly monitoring your UF email account (i.e., checking it daily).

I will not use the Canvas messaging feature, nor respond to these messages. I archive all email messages, and Canvas does not generate a usable record of our correspondence. Send all email correspondence to [thomas.knight@ufl.edu](mailto:thomas.knight@ufl.edu).

## **COURSE GRADING POLICY**

Grades are calculated and assigned according to a total point system. There are 100 possible points, and the breakdown is as follows:

- 1) Each of the 5 Problem Sets is worth 10 possible points.
- 2) The Final Exam is worth 50 possible points.

I will use this calculation to determine each student's within class standing and assign final grades based on that information.

## **PROBLEM SET GUIDELINES**

There are five problem sets required for successful completion this course. These problem sets are designed to provide you with practice with the theories, models, and analytical tools covered in the course. My hope is that these problem sets will assist you in understanding of the technical content of this course, and in preparing for the final exam.

You should submit a PDF file into Canvas by the deadline. Your scanned submission should be high-quality and professionally presented. Your handwriting must be legible, and graphs must be accurate. Responses that are not clearly correct and presented professionally will not earn credit. Late submissions will not be accepted.

You may work in groups, but each student is responsible for turning in his or her own work, which must include his or her own individual mathematical derivations and written explanations.

## **PROBLEM SET SCHEDULE**

<u>Problem Set</u>	<u>Opening Date</u>	<u>Due Date</u>
Problem Set 1	Monday, Oct. 26 @ 11:30am	Monday, Nov. 2 @ 9:30am
Problem Set 2	Monday, Nov. 2 @ 11:30am	Monday, Nov. 9 @ 9:30am
Problem Set 3	Monday, Nov. 9 @ 11:30am	Wednesday, Nov. 18 @ 9:30am
Problem Set 4	Wednesday, Nov. 18 @ 11:30am	Monday, Nov. 30 @ 9:30am
Problem Set 5	Monday, Nov. 30 @ 11:30am	Monday, Dec. 7 @ 9:30am

## **FINAL EXAM**

The Final Exam will be administered virtually in Canvas. This is a closed book/closed note exam. All students must compete this exam synchronously (i.e., at the same time) to maintain academic integrity. The exam will begin at 9:30am on Wednesday, December 9<sup>th</sup>. You must begin the exam no later than 9:45am. Otherwise, your score will be invalidated. You have 120 minutes to complete this exam.

Non-programmable, four-function and scientific calculators are allowed; no other calculators are permitted. You may not use a graphing calculator or any device with communications abilities. The use of cell phones, PDAs, or any other programmable device during an exam is not allowed, and violating this policy constitutes a violation of the University of Florida Student Honor Code.

You must have a strong and reliable internet connection to take online exams using Honor Lock. When taking online exams, some general best practices are...

1. Use a hardwired ethernet connection if possible.
2. If you must use WiFi, you should ensure that you have a strong and stable internet connection. As a rule of thumb, if you have trouble streaming videos, you will not be able to take an online exam.
3. If you must use WiFi, ask others to refrain from using the internet during your exam if possible.
4. Public WiFi and Hotspots are not suitable for taking online exams.

### **ACADEMIC HONESTY**

You may collaborate on the Problem Sets, but you should turn in your own submission that represents your own efforts and analyses. The final exam is taken individually, and collaboration is explicitly prohibited.

You are expected to abide by the University's rules for academic honesty. These rules are available for your review at <https://sccr.dso.ufl.edu/process/honor-code/>.

I take these rules very seriously and am committed to upholding the policies and integrity of the University of Florida and the Ph.D. in Economics program. Cheating, plagiarism, or any other behavior that violates these rules will be prosecuted to the fullest extent.

### **SPECIAL NEEDS AND GENERAL COMMENTS ON WELLNESS**

If you are a student with special needs and you require additional resources to participate successfully in this course, please contact me during the first week of classes. The Disability Resource Center may provide reasonable accommodations to support your success. Once you obtain documentation from the DRC, please forward it to me, and accommodations can be arranged.

Graduate School is an exciting learning experience and a unique opportunity for personal growth. It can, however, also be a stressful and difficult transitional period. If you are ever having general issues with your coursework *in any course* or trouble in your personal life, please seek help from myself or another faculty member. I also encourage you to utilize the *FREE* and *ANONYMOUS* services of the UF Counseling and Wellness Center.

### **NOTE ON END-OF-TERM COURSE EVALUATIONS**

At the end of each term, you have the ability to evaluate the quality of each of your courses and the effectiveness of your instructors. I encourage you to take this opportunity seriously and to provide serious and informative feedback. Personally, I am always trying to improve my courses – tweaking them bit-by-bit each term – and student feedback is essential to making real improvements. As the term nears an end, I will discuss this opportunity in lecture, as I believe the high quality of your education depends on your constructive criticism and affirming support. You can access end-of-term course evaluations at:

<https://ufl.bluer.com/ufl/>

### **COURSE SCHEDULE**

<u>Monday, Oct. 26</u>	Syllabus and Introduction to Games and Strategies Reading: Syllabus, Chapters 1 and 2 (O), Chapters 1 and 2 (H) Problem Set 1 opens @ 11:30am
<u>Wednesday, Oct. 28</u>	Dominant Strategies, Dominance Solvability, and Nash Equilibrium Reading: Chapter 2 (O), Chapters 3 and 4 (H)
<u>Monday, Nov. 2</u>	Expected Utility and Mixed Strategies Reading: Chapter 4 (O), Chapter 7 (H) Problem Set 1 due @ 9:30am Problem Set 2 opens @ 11:30am
<u>Wednesday, Nov. 4</u>	(Simultaneous-Play) Continuous Strategies* Reading: Chapter 3 (O), Chapter 6 (H)
<u>Monday, Nov. 9</u>	Extensive Form and Sequential Play Reading: Chapter 5 (O), Chapter 8 (H) Problem Set 2 due @ 9:30am Problem Set 3 opens @ 11:30am
<u>Wednesday, Nov. 11</u>	NO CLASS: VETERANS DAY HOLIDAY
<u>Monday, Nov. 16</u>	Applications and Extensions of Sequential Play Reading: Chapter 6 (O), Chapter 8 (H)
<u>Wednesday, Nov. 18</u>	Stage Games* Reading: Chapter 7 (O) Problem Set 3 due @ 9:30am Problem Set 4 opens @ 11:30am
<u>Monday, Nov. 23</u>	Repeated Play Reading: Chapters 14 and 15 (O), Chapters 13 and 14 (H)
<u>Wednesday, Nov. 25</u>	NO CLASS: THANKSGIVING HOLIDAY
<u>Monday, Nov. 30</u>	(Simultaneous- and Sequential-Play) Games of Incomplete Information Reading: Chapters 9 and 10 (O), Chapters 9 and 10 (H) Problem Set 4 due @ 9:30am Problem Set 5 opens @ 11:30am
<u>Wednesday, Dec. 2</u>	(Simultaneous- and Sequential-Play) Games of Incomplete Information * Reading: Chapters 9 and 10 (O), Chapters 9 and 10 (H)
<u>Monday, Dec. 7</u>	Exam Review Problem Set 5 due @ 9:30am
<u>Wednesday, Dec. 9</u>	Final Exam (@ 9:30am)