ECO 4400: Game Theory and Applications
Syllabus

Dr. Thomas Knight
Office: MAT 224
Office Hours: T/R 9:00-10:00am

Fall 2023
Course Time: T/R 1:55-3:50am
Course Location: MAT 103
Email: thomas.knight@ufl.edu

Prerequisites: **Principles in Microeconomics (ECO 2023 *or equivalent*) and Calculus I (MAC 2233 *or equivalent)***

Required Text: **1) "Games, Strategies, and Decision Making" by Joseph E. Harrington**
2) MobLab access

FIRST WEEK READING ASSIGNMENTS

1) Read the Syllabus
2) Complete the "Student Information Form" (Page 6)
3) *If needed*: Review basic differential calculus

STUDENT RESPONSIBILITIES ***--be careful to read the syllabus for unique features of this course***

• 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.

• Students are expected to attend regularly and participate actively in this course. It is assumed that you have read the assigned material before each class and are prepared to answer questions based on the readings.

•I ask a number of directed questions during the lecture period of the course. Students are selected at random (without replacement -- *in order to ensure that all students have an equal opportunity to answer questions*) to answer questions based on the required readings and lecture material. These questions are not intended to trick you or "test" you on the required readings; they are simply intended to enhance course participation. You are free to "take a pass" if you do not feel comfortable answering a particular question.

• Students are expected to complete 8 analytic problem sets. These problem sets relate to the topics of the preceding lectures and are intended to offer you practice with the relevant solution techniques. In some cases, questions offer important extensions of the material covered in class. All problem sets are due at the beginning of class (i.e., 1:55pm) on the due date; late problem sets will not be accepted for partial credit. ***See Page 5 for a more thorough explanation of problem sets.***

• Students are expected to present their solutions to the analytic problem sets and other in-class handouts during class. On days when problem sets are due, the first portion of the course period is dedicated to student presentations of selected solutions. Students are selected at random (without replacement -- *in order to ensure that all students have an equal opportunity to answer questions*) to present their solutions. If you are unsure of the solution, I will assist you in presenting the answer, but you will not be able to "take a pass."

Note: Because the problem sets are submitted in Canvas, you will not have access to your assignment when presenting. I encourage you to bring a printed copy.

• Any lapse of appropriate conduct while a fellow classmate is presenting may result in a final course grade reduction of one letter grade. Many people are afraid to present their own work in front of their peers, and it is our shared obligation to make their presentation as painless as possible.

• Students are expected participate in 5 in-class game sessions. These games are intended to provide students with practical, hands-on experience with the game theoretic topics covered in the course. Students' grades will depend both on their participation and performance.

•There are three in-class exams: Midterm 1 (Oct. 5), Midterm 2 (Nov. 9), and Final Exam (Dec. 5).

COURSE RESOURCES (AND HINTS FOR SUCCESS)

• The problem sets are the greatest resource you have. These problem sets provide an almost-comprehensive review of the relevant course material and solution techniques. I recommend taking thorough notes when the solutions are presented in class, as solutions are *not* handed out in class.

• I provide sample exams (with solutions). These exams offer insight into the structure and difficulty level of the actual exams, but they do not necessarily cover the same material. *Also, students regularly report that sample (or old) exams are less difficult than current term exams. Be prepared for this!*

• Superficial cramming will not lead to success; keeping up with the material is essential. After each lecture, review your notes, and test whether you understand a particular concept. You may, for example, take an example from class in which I solved for Subgame Perfect Nash Equilibrium and ask how the equilibrium would change with a certain change in the players' payoffs. These thought exercises increase your exposure to the material and sharpen your ability to apply the analytic tools covered in class.

• As with any "tools" course (e.g., mathematics), the only way to learn the material is to practice it. Take advantage of the many resources you have.

OFFICE HOURS

• You are encouraged to attend office hours; attendance is highly correlated with success.

• Attempt problem sets before you bring questions to office hours; the problem sets are substantially less beneficial if you do not attempt them on your own. Again, the purpose of assigning the problem sets is to facilitate learning and prepare you for success on the exams.

GRADING POLICY AND SCALE

• Grades are calculated as follows: Analytic Problem Sets and Presentations (20%), Game Session Participation (5%), Midterm 1 (25%), Midterm 2 (25%), and Final Exam (25%).

• For each gaming session, the 15 highest performing students (as determined by a Borda scoring mechanism) will receive extra credit of ½ point on their final course grade. In the event of a tie at the extra credit threshold, all students with the score of the 15th highest performing student will receive extra credit.

92.50-100	***A***	***77.50-79.99***	***C+***
90.00-92.49	***A-***	***72.50-77.49***	***C***
87.50-89.99	***B+***	***70.00-72.49***	***C-***
82.50-87.49	***B***	***65.00-69.99***	***D***
80.00-82.49	***B-***	***0-64.99***	***E***

A grade of C- is not a qualifying grade for major, minor, Gen Ed, or College Basic distribution credit. Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:

Make-up exams and assignment extensions should be arranged before the exam date/time and will only be offered to accommodate absences that are explicitly excused by the UF Attendance Policy. In most cases, documentation will be required. Keep in mind that your academic obligations *always* take precedence over personal and social commitments. This includes UF-related social events.

Unexcused absences from in-class exams and failure to submit assignments on time result in a zero.

http://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

---AND---

http://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

PROBLEM SET GUIDELINES

There are eight 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 three exams.

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 – in fact, I strongly recommend it. However, 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

Problem Set	Due Date
Problem Set 1	Tuesday, September 5 @ 1:55pm
Problem Set 2	Thursday, September 14 @ 1:55pm
Problem Set 3	Tuesday, September 26 @ 1:55pm
Problem Set 4	Tuesday, October 3 @ 1:55pm
Problem Set 5	Thursday, October 19 @ 1:55pm
Problem Set 6	Thursday, November 2 @ 1:55pm
Problem Set 7	Tuesday, November 21 @ 1:55pm
Problem Set 8	Thursday, November 30 @ 1:55pm

ATTENDANCE POLICY

Irregular attendance and/or tardiness will most likely result in substantially reduced course performance, as well as reflect poorly upon your commitment to this course. There are also two ways in which attendance (or lack thereof) can result in a reduction of your final grade:

1) **Failure to notify me - *before the class period in question* - of an absence for a class period in which you are selected to present a problem set or in-class hand-out solution will result in a 50% reduction in the "Analytic Problem Sets and Presentations" portion of your grade.**
2) **Participation in each Game Session counts as 1 point of your final grade. In order to participate, you must be present. Any absences from a Game Session must be excused in advance, and excused absences will only be offered for absences that are explicitly excused by the UF Attendance Policy. Keep in mind that your academic obligations *always* take precedence over personal and social commitments. This includes UF-related social events.**

GENERAL COMMENTS ON WELLNESS AND SUCCESS

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 special accommodations for students. Once you obtain documentation from the DRC, please forward it to me and accommodations will be arranged.

College is an exciting learning experience and a unique opportunity for personal growth. It can, however, also be a stressful and difficult transitionary 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: https://counseling.ufl.edu

ACADEMIC HONESTY

You are expected to abide by the University's rules for academic honesty as outlined in the UF Student Honor Code (https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/). All suspicious evidence of cheating, plagiarism, making false statements, and any other violation of these rules will be reported to the Dean of Students Office. Additionally, I will advocate for the strictest of available sanctions (inc. dismissal from the University of Florida) for any student who is found responsible for violating these rules.

It is important to note that cheating and plagiarism are not the only forms of academic dishonesty. "Making a false or misleading statement for the purpose of procuring an improper academic advantage" is also a violation of the UF Student Honor Code. This includes making false statements to your instructor and/or presenting forged documents (e.g., doctors' notes). I verify all suspicious claims and documents, for example, by contacting a student's medical provider or by reviewing a student's UF systems connection data.

While collaboration on the problem sets is permitted, any work that you submit for evaluation and grading should be your own. Collaboration on exams is strictly prohibited.

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 issue (numerous times) 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.bluera.com/ufl/*

COURSE OUTLINE (AND ASSIGNMENT SCHEDULE)

L1	**August 24**	**Syllabus**
L2	**August 29**	**Introduction to Game Theory** ***Harrington*, Chapters 1 and 2** **Student Information Form due at the beginning of class**
L3	**August 31**	**Dominant Strategies and Nash Equilibrium** ***Harrington*, Chapters 3 and 4**
L4	**September 5**	**Game Session 1** **Problem Set I due at the beginning of class (1:55pm).**
L5	**September 7**	**Alternate Strategies: Maximin, Maximax, and Minimax Regret Solvability** ***Reading Assignment TBA***
L6	**September 12**	**N-Player Games** ***Harrington*, Chapter 5**
L7	**September 14**	**Game Session 2** **Problem Set II due at the beginning of class (1:55pm).**
L8	**September 19**	**Mixed Strategy Nash Equilibria** ***Harrington*, Chapter 7**
L9	**September 21**	**Mixed Strategy Nash Equilibria** ***Harrington*, Chapter 7**
L10	**September 26**	**Subgame Perfection in Discrete Choice Games** ***Harrington*, Chapter 8** **Problem Set III due at the beginning of class (1:55pm).**
L11	**September 28**	**Subgame Perfection in Discrete Choice Games** ***Harrington*, Chapter 8**
L12	**October 3**	**Exam Review** **Problem Set IV due at the beginning of class (1:55pm).**
October 5		**FIRST MIDTERM EXAMINATION**
L13	**October 10**	**Calculus Review, Partial Differentiation, and Profit Maximization**
L14	**October 12**	**Continuous Games** ***Harrington*, Chapter 6**
L15	**October 17**	**Continuous Games and Imperfect Competition** ***Harrington*, Chapter 6**
L16	**October 19**	**Game Session 3** **Problem Set V due at the beginning of class (1:55pm).**

L17	**October 24**	**Introduction to Repeated Games** ***Harrington*, Chapters 13 and 14**
L18	**October 26**	**Infinitely Repeated Games** ***Harrington*, Chapters 13 and 14**
L19	**October 31**	**Infinitely Repeated Games** ***Harrington*, Chapters 13 and 14**
L20	**November 2**	**Game Session 4** **Problem Set VI due at the beginning of class (1:55pm).**
L21	**November 7**	**Exam Review**
November 9		**SECOND MIDTERM EXAMINATION**
L22	**November 14**	**Imperfect Information: Simultaneous-play** ***Harrington*, Chapter 9**
L23	**November 16**	**Imperfection Information: Bayesian Games** ***Harrington*, Chapter 10 (10.1-10.3)**
L24	**November 21**	**Applications of Game Theory: Voting** **Problem Set VII due at the beginning of class (1:55pm).**
November 23		**NO CLASS: Thanksgiving Break**
L25	**November 28**	**Applications of Game Theory: Auctions** ***Reading Assignment TBA***
L26	**November 30**	**Game Session 5** **End-of-Course Evaluations** **Problem Set VIII due at the beginning of class (1:55pm).**
December 5		**THIRD EXAMINATION**

Student Information Form **Fall 2023**

ECO 4400: Game Theory and Applications

Name:	**Phone Number:**
Major:	**Email Address:**
Year (e.g., junior):	**May I include your phone number on the class list?** Yes_____ No_____
	May I include your email address on the class list? Yes_____ No_____

Principles in Microeconomics **and** ***Calculus*** **are prerequisites for this course. Please confirm that you meet these requirements.**

Which economics courses have you taken? Please make note of courses that were taken as Advanced Placement (AP) or at another college or university.

Which math courses have you taken? Please make note of courses that were taken as Advanced Placement (AP) or at another college or university.

What attracts you to the study of economics? What particular areas of economic inquiry interest you?

This is an elective course. What interests you about game theory?