

Mode: Online
Office Hrs: After class & by appt; Zoom
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Class Mtg: MWF 10-10:50; Zoom
Website: Canvas

Introduction

Welcome! What is game theory? Why is it relevant to Data Science and Business Analytics in general and Quantitative Economics in particular? Much of DSBA, micro economics and operations research, and some parts of computer science and the social sciences fall under the umbrella of *Decision Science*, and another name for game theory is *Multi-Agent Decision Theory*. It is the theory of optimal decisions with uncertainty not only about technical matters but also about what others will chose. It is inherently strategic and social. We won't deal with datasets, statistical packages, or machine learning algorithms, but DSBA is about to giving decision makers information to which to apply GAME THEORY!

Catalog Description

The course is organized around a coherent theme each semester, but that theme will change from semester to semester depending on current student and faculty interest and the issues prominent at the time. Possible examples include the Economics of the Labor Market and Automation, the Economics of Health, the Economics of the Federal Budget, Debt, and Entitlements, or the Economics of the Market for STEM Graduates.

Prerequisites: Calculus 1 (MAC 2311), Statistics 1 (STA 2023), or equivalent.

Communication/Computation Skills Requirement (6A-10.030): Yes

Course Objective

The course will develop applied economic analysis skills while helping students gain context to better understand the broader world they will be working in by applying those skills to the topic selected for the semester.

Textbook

Joel Watson. 2013. *Strategy: An Introduction to Game Theory*. Third Edition.

Class Delivery

- I will record “lectures” several days before class meetings—about 25 minutes for every 50-minute hour of instruction. You should complete the relevant assigned reading and watch the day's lectures before live class meetings. Take good notes and write down questions—you will need both the notes and the questions them later for graded course components.
- After completing the reading and watch the lectures, post questions and comments to the appropriate discussion topic in canvas. As appropriate, respond to classmates' questions with answer's, comments, or follow up questions. Posting links to related articles you are interested in works too, as long you explain why you are interested in it and how it relates to the material. This is required and counts toward your grade.
- Class meetings are for answering questions from the discussion board, follow up questions, discussion, and working examples. Attendance is expected and counts towards participation credit. Meetings will be recorded for later reference

- Class meetings and office hours are in my meeting space on Zoom. I believe Zoom offers several distinct advantages for this type of class so I have paid for my own Zoom Pro subscription which we will use (free for you). You should install the zoom client, not just use the online meeting capability. Here is the link: <https://us02web.zoom.us/j/3733945591>. Alternatively, open zoom, click join meeting, and use this meeting ID: 373 394 5591.
- Have your camera on so we can see one another as we participate in discussion. If you do not have access to a working web cam, schedule a meeting with me to discuss the matter.

Degree Program and Course Learning Outcomes and Alignment

Data Science / Business Analytics Program Outcomes	Course Outcomes *		
	1. Apply principles and techniques of economic analysis to represent core problems, issues, or decisions related to the selected topic(s).	2 Communicate the central problems, tensions, or opportunities pertaining to the course theme.	3. Analyze differing perspectives on the current issue or topic forming the course theme.
1. Apply current (data science/business analytics) concepts, techniques & practices to solve (complex/business) problems.	X		
2. DS : Analyze a given data science problem and formulate a solution in terms of the datasets needed, the techniques required or the technologies to be utilized. BA : Analyze a given business problem using appropriate analytics techniques to generate insights and solutions.	X		X
3. Communicate effectively insights, analysis, conclusions, & solutions to a diverse audience.		X	

* These special topics outcomes must be interpreted as appropriate to each semester's content.

Graded Coursework

Exercises (15%) After each meeting I will assign exercises from the end of the corresponding chapters due one week later—about one or two per class and three to five per week. Exercises engage you with challenging material to facilitate learning. Expect to invest significant time in them. You are encouraged to work with other students. However, if you don't push yourself to work them on your own first, you will cheat yourself of the best chance to learn the material.

Reaction and Analysis Papers (15%) Four brief papers (2-4 pages) in which you react to and analyze a current event using concepts from class.

Midterm Exam (15%) The midterm exam will be at the normal class meeting time on Friday October 9th so I can grade it before the midterm grade deadline.

Course Portfolio (20%) Comprising five neat and professionally organized sections.

- 1) Notes from readings and lectures
- 2) All exercises, as completed. Also, an analysis of your mistakes prepared after the solutions are posted. Explain where you went wrong and why you went wrong in that way.
- 3) The four Reaction and Analysis papers as submitted. Also, revised (corrections, additions, or otherwise) in response to feedback.
- 4) The midterm exam as completed. Also, an analysis of your mistakes prepared after the solutions are posted. Explain where you went wrong and why you went wrong in that way.

The midterm version of this counts for 3 of the 15 points. The final version is due the day of the final exam. Why? Preparing it should be good preparation for the exam, having prepared it you should study it, and studying it will lead you to spot places you can improve it.

Final Exam (20%) The final exam will occur at the assigned time (TBA) during finals week December 7th–11th. To reward improvement and prevent a bad day from unduly influencing your grade, the final counts in place of the midterm if it is higher.

Participation (15%) Depends on regular attendance and engagement including asking questions, responding when called upon, being attentive and required discussion board participation.

Grading

Grades for all coursework will be assigned according to the following criteria.

Grade	Points	Criteria
P	5.0	Exceptionally rare quality far above and beyond all expectations. Mistake free. Explained & supported completely. Extremely neat. Organization crystal clear. Writing excellent. Looks & reads as if prepared by the leading expert in the area and professionally edited & formatted. The all but unachievable ideal of perfection.
A	4.0	Demonstrates mastery. Complete. Correct approach. Possibly minor errors in arithmetic. No conceptual errors. Fully explained and supported. Neat and well organized with clear exposition. Grammatical errors minor.
B	3.0	Demonstrates proficiency but short of mastery. Complete or nearly so. Approach is generally correct, though there may be small conceptual errors. There may be significant mathematical errors if they do not reveal additional conceptual flaws. Explanation and support are clear and reasonable, if not complete or fully correct. Neatness, organization and exposition allow the answer to be easily understood.
C	2.0	Demonstrates proficiency with the most important components but otherwise incorrect or incomplete. Explanation & support incomplete or incorrect. Neatness, organization and exposition allow the answer to be understood with minimal effort.
D	1.0	Reasonable effort but does not demonstrate proficiency. Approach, explanation, & support show some relation to the question but little is correct. Neatness, organization & exposition allow the answer to be understood.
F	0.0	No attempt, unresponsive, nearly all wrong, or too messy to follow.

*Partial credit between letter grades will be given in tenths of a points.

Exams: Each question will be graded using these criteria and points averaged determine the overall grade. Due to the time constraint, neatness and writing quality will be judged leniently.

Exercises: Each question will be graded using these criteria and points will be averaged across questions to determine the overall grade Since you have time, neatness, organization, and writing quality are judged somewhat stringently. Since exercises are intended to facilitate learning, not evaluate learning, completeness and correctness are judged leniently.

Papers and Portfolio: These will be graded as a whole. Since you have time and we will have covered relevant material, completeness, correctness, neatness, organization, and exposition are all judged stringently.

Course Grades

Grades will be averaged within each assignment category. Category averages will be averaged using the weights specified above. Final course grades will be determined by this weighted average according to the table to the right. [Grading policy](#).

Make-up Policy

If the midterm is missed, the final exam will automatically count in its place. If the final is missed a make-up may be taken **ONLY** with a documented excuse recognized by university policy. Work conflicts **ARE NOT** a valid excuse. Let your employer know now that you must be available to take exams at the announced times. I accept late assignments with a penalty that is minimal at first, increases with lateness, and is 50% for work turned in after solutions are released. [Attendance policy](#).

Course Grade	Weighted Average Points	
	At least	Less than
A	3.833	
A-	3.500	3.833
B+	3.167	3.500
B	2.833	3.167
B-	2.500	2.833
C+	2.167	2.500
C	1.833	2.167
C-	1.500	1.833
D+	1.167	1.500
D	0.833	1.167
D-	0.500	0.833
F		0.500

Tentative Schedule of Assignment and Exam Dates

Assignment or Exam	Due Date
Exercises assigned continuously (see above)	One week after assigned
Reaction and Analysis #1	Friday September 25
Midterm Exam	Friday October 9
Reaction and Analysis #2	Friday October 16
Midterm Class Portfolio	Friday October 23
Reaction and Analysis #3	Friday November 6
Reaction and Analysis #4	Monday November 23
Final Class Portfolio	TBA
Final Exam	TBA

Tentative Topic Outline and Schedule

Chapter	Topic	Week	Exercises
Part I: Introduction and Building Blocks			
1	Introduction	1	
2	The Extensive Form	1	1, 2, 4, 6
3	Strategies and the Normal Form	2	1, 4, 7
4	Beliefs, Mixed Strategies, and Expected Payoffs	2	2, 3, 5
5	General Assumptions and Methodology	2	
Part II: Analyzing Behavior in Static Settings			
6	Dominance and Best Response	3	3, 7, 10
7	Rationalizability and Iterated Dominance	3	1, 3, 4
8	Location and Partnership	4	2, 5, 8
9	Nash Equilibrium	4	1, 2, 9
10	Oligopoly, Tariffs, Crime, and Voting	5	1, 6, 8
11	Mixed-Strategy Nash Equilibrium	6	2, 3, 4
12	Strictly Competitive Games and Security Strategies	6	1, 2, 4
13	Contract, Law, and Enforcement in Static Settings	7	3, 5, 6
Part III: Analyzing Behavior in Static Settings *			
14	Details of the Extensive Form	8	1, 2, 3
15	Backward Induction and Subgame Perfection	8	1, 5, 7
16	Topics in Industrial Organization	9	2, 4, 8
17	Parlor Games	9	1, 4
18	Bargaining Problems	10	2
19	Analysis of Simple Bargaining Games	10	4, 8
20	Games with Joint Decisions; Negotiation Equilibrium	11	
21	Unverifiable Investment, Hold Up, Options, and Ownership	11	1, 2, 4, 6
22	Repeated Games and Reputation	12	1, 2, 9
23	Collusion, Trade Agreements, and Goodwill	12	1, 2, 3
Part IV: Information *			
24	Random Events and Incomplete Information	13	1, 2, 3
25	Risk and Incentives in Contracting	13	1, 2
26	Bayesian Nash Equilibrium and Rationalizability	14	1, 2, 5
27	Lemons, Auctions, and Information Aggregation	14	2, 7, 9
28	Perfect Bayesian Equilibrium	15	1, 2
29	Job-Market Signaling and Reputation	15	3, 5

* We will skip portions of the material in parts III and IV depending on time and interest.

Revisions to the Syllabus

The instructor reserves the right to correct typos or other errors in the syllabus and to make adjustments reasonably needed to maintain the quality and function of the course.

Academic Support

- Students can access the Florida Polytechnic University Library through the University website and Canvas, on and off campus. Students may direct questions to the Academic Success Center or by e-mail to success@floridapoly.edu or library@floridapoly.edu.
- The Academic Success Center, located in the IST and at ASC East, provides a range of services. Students may direct questions to success@floridapoly.edu.

University Policies

- [Academic Integrity](#). All students must commit to the highest ethical standards in completion of all academic pursuits and endeavors, whether in classroom or online environments.
- [Covid-19 Statement](#) Regardless of the mode of course delivery, all Florida Poly students are asked to make a Campus Commitment demonstrating respect and consideration for themselves or others, and for the people they care about. This Campus Commitment includes monitoring one's health and seeking medical care when appropriate; wearing face-coverings and respecting social-distancing, especially in the classroom and in gatherings; washing one's hands frequently (and when not possible using hand-sanitizer); following medical guidance; and participating in keeping shared spaces clean. If you are experiencing any symptom(s) of COVID-19 outlined by the CDC, you must stay home or in your residence hall room and immediately contact the associate director of campus wellness management at 863-874-8599 or email care@floridapoly.edu.

Basic rules for in the classroom, IST, and Campus:

1. You MUST have a face-covering.
 2. Leave the furniture on its correct floor markings, or if it is moved, please return it to those markings.
 3. Whenever possible, clean your space with a sanitizing wipe before you start and when you are finished with class.
 4. Do not remove sanitizing wipes or hand sanitizers from their set locations—they are put there for everyone.
 5. Follow directional signs throughout the buildings and respect appropriate social-distancing.
 6. Study hard and engage with all of your courses!
- [Reasonable Accommodations](#): Florida Polytechnic University is committed to assisting students with disabilities and offering reasonable accommodations to those with documented eligibility. The Office of Disability Services (ODS) coordinates accommodations for students with disabilities in accordance with the ADA Amendments Act of 2008 (ADAAA), the Americans with Disabilities Act of 1990 (ADA), and Section 504 of the Rehabilitation Act of 1973. Reasonable accommodations are determined on an individual basis through an interactive process between you, ODS, and your instructor(s). If you have already registered with ODS, please ensure that you have requested an accommodation letter for this course and communicate with your instructor about your approved accommodations at your earliest convenience. If you are not registered with ODS but believe you have a temporary health condition or permanent disability requiring an accommodation, please contact ODS as soon as possible: DisabilityServices@floridapoly.edu, (863)874-8770, ASC East [ODS website](#): www.floridapoly.edu > Student Affairs > Health Wellness > Disability Services
 - [Accommodations for Religious Observances, Practices and Beliefs](#)
 - [Title IX](#): Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sex discrimination and sexual misconduct, including sexual harassment, sexual assault, dating violence, domestic violence and stalking. It is important for you to know resources are available if you or someone you know needs assistance. You may speak to your professor, but your professors have an obligation to report the incident to the Title IX Coordinator. It is an educational goal that you feel able to share information related to your life experiences in classroom discussions and in one-on-one meetings. However, it is requirement for university employees to share information with the Title IX Coordinator regarding disclosure. However, please know that your information will be kept private to the greatest extent possible. You will not be required to share your experience. If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Florida Polytechnic University [Ombuds Office](#), BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at [Peace River Center](#), 863-413-2707 (24-hour hotline) or 863-413-2708 to schedule an appointment.