ECO 4400 U01: Strategy and Information

Dr. Jesse Bull

Office: DM 319C

Office Hours: Thursdays 11:20am – 12:20pm in person, Tuesdays on Zoom 12:30 – 1:30pm (please confirm the day before), and by appointment

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# Lecture:

PCA 167, TH 12:30pm – 1:45pm, Fall 2024.

# Teaching Assistant:

TBD

# Welcome to Econ 4400

I’m looking forward to this semester and am excited for you to learn the concepts we will cover. Please read through this syllabus. As explained below, we’ll use a hybrid approach to our remote learning this semester. Our in-person synchronous meetings are scheduled for Thursdays from 12:30 to 1:45pm. I will post slides with the problems we work in class and solutions for them. We’ll discuss the details of our hybrid approach further in our first meeting.

# Course Description:

(From the catalog) Combines neoclassical economics with game theory and the economics of information to better understand markets in the real world. Prerequisites: Calculus and ECO 3101 or permission of instructor.

# Course Goal:

That you develop your ability to think strategically.

# Course Objectives:

This course will focus on game theory, which is a way to model and predict behavior in a strategic situation. A strategic situation is one in which the actions of one person influence the payoff of another. You will encounter many such situations in most facets of life. The coverage of material will emphasize conceptual and fundamental understanding.

I believe the concepts we will cover in this course are very useful for many situations you will face in your career (regardless of your career) and am excited to help each of you to learn these. The ways in which we will approach problems will help develop your intuition and mathematical problem-solving skills.

# How to do Well:

An important step for learning the material is doing lots of practice problems. I will guide you in this in several ways. Our in-person meetings will focus on practice problems. I will also suggest problems from the text and provide previous exams (with solutions). These problem-solving skills can be developed, regardless of your background or preparation for this course. Just like exercise, learning a musical instrument, a sport, or foreign language, learning the material and getting better at it requires time and effort. Of course, I will provide guidance.

In my experience, working consistently on learning the course material and on practice problems is very helpful. To help and encourage this, a portion of your grade will be based on you watching the recorded lectures and reflecting on what you have learned. Another portion will be based on you doing regular (almost weekly) homework assignments.

# Course Format:

As noted above, we’ll use a hybrid type format. The synchronous in-person meeting will be on Thursdays from 12:30 to 1:45pm, which is our scheduled class time. We will primarily use this time to actively work on problems related to that week’s topic. Your participation in this is important for learning the material so class participation is a component of your grade. I anticipate this to be quite helpful since solving problems is an important skill to develop to learn the material and do well in the course. I will post slides with the problems we work in class and solutions for them.

Since the in-person meeting time will primarily be used for doing problems, the introduction of the concepts will occur outside of class time. This will be done through recorded lectures, reading the text, and practicing problems on your own. In addition to the recorded lectures, the slides for them are also available in Canvas. Some of the recordings will include worked out example problems. I’ve tried to keep the recordings short and engaging.

A typical week will proceed as follows. You’ll be asked to watch the recorded lectures for that week’s topic by Tuesday of that week. In addition to that you’ll be asked to post in the relevant discussion on Canvas a “2-1-1” comment by 11:59pm on that Tuesday. This asks you to describe, based on the recordings you viewed: 2 things you learned, 1 way you can apply it to the real world, and 1 (or more) question(s) you have. If you do not have a question, it is fine to not include one. The reason that I ask that this be done by Tuesday night is so that I have time to see what questions you all have and tailor our activities on Thursday to address questions. I’ll also ask that you respond to the posts of at least two of your classmates. You will have until Tuesday the following week to do that. Naturally, completing your 2-1-1 posts and responding to your classmates in earnest will earn you points. Your lowest three scores for these will be dropped.

Additionally, you will be asked to complete and submit a short homework each week (through week 11). This will typically be a single problem. These will be graded with a focus on whether you are making a good faith attempt at the problem. It is intended to provide some credit for you starting to work on problems soon after the material is covered. Your lowest three scores for these will be dropped. In addition to the homework, there are suggested problems from the text listed in the schedule. There are also some exams from previous years with solutions in Canvas.

The more formal evaluation of your knowledge of the course material will be done through two exams, a larger homework/project covering Bayesian games, and a paper. The exams will be in class.

# Paper:

You will be asked to write a paper (roughly 5 to 12 pages) in which you apply a game theoretic solution concept to a practical problem. This will be due at the University scheduled final time. Additionally, you will be asked to submit a rough draft by November 9th. This will allow me to provide feedback to you before your final version is due. Writing your paper should be viewed as an ongoing process that involves editing.

We will discuss the paper requirements as the course progresses. Your paper should use concepts covered in the course to analyze a practical example of your choosing. It should present a game representation of the example and provide some insights based on your own analysis. The paper should be typed and well written.

Turnitin will be used to assess the originality of your paper and rough draft.

I really enjoy this assignment as it’s a great opportunity to apply the concepts you’ve learned to a practical problem. This is good preparation for many types of projects you might be asked to work on in your career. I look forward to discussing your paper ideas with you and reading your paper.

# Grading:

Grades are based on the discussion posts (13%), the (almost) weekly homework (10%), strategic journal (7%), class participation (5%), exams (15% each), information assignment (15%) and paper (including rough draft) (20%).

# Exams:

There will be two exams (in class on October 11th and November 7th),

# Information Assignment:

This will be a larger homework covering the topics following Exam 2. It will be due December 9th.

# Strategic Journal:

There are two strategic journal assignments. Each should be one page or less. This short reflection writing is aimed you applying the concepts to practical situations. No formal analysis is required for this assignment. You just need to briefly describe a strategic situation and suggest some behavior in the situation. The situation can come from everyday life, news, a book, a movie, or other situation. Turnitin will be used to assess the originality of your submission. This does not need to be written formally. The focus is that you make a good faith effort to consider a practical application. Additionally, the assignment is intended to provide an opportunity for you to begin to consider possible topics for your larger paper that is due later in the semester. The first of these is due on September 26th, and the second is due on October 17th.

# Use of AI

I understand that generative AI is a tool that is available in practical situations.  So, you are free to choose to use generative AI (such as ChatGPT) to help with any outside of class assignments (naturally, these may not be used for exams). However, if you choose to do so, you are required to include a statement explaining how and the extent to which it was used, which generative AI platform was used and include all prompts that you used to generate any component of your assignment.

It's worth noting that generative AI often has difficulty with getting citations correct. It is your responsibility, whether using generative AI or not, to ensure that all work drawn upon is properly cited.

# Teamwork

The ability to work in a team environment is important for most career paths. I’m not referring to simply dividing various tasks and combining individual parts. Instead, I have in mind situations where all members of a team have input and development of the entire project, although some parts may be worked on individually and then combined in a cohesive manner. Teammates may have leadership roles in different dimensions. Team building, relationships, responsibility, and humility are critical to a successful team.

Since this is an important skill and I believe that discussing economics concepts facilitates learning, all outside of class assignments other than discussion posts, may be completed in teams of two.

If you choose to complete an assignment in a team, both teammates should submit the same assignment with both of their names on it and note in the submission comments that they’ve completed it as a team, the name of their teammate, and a statement that both have contributed to the assignment. It is expected that both teammates will contribute to any assignment.

# Learning Outcomes:

By the end of this course, you will be able to represent many economic situations, in which the parties behave strategically, with basic games and solve for the parties’ equilibrium behavior in those situations. You will be able to analyze static and dynamic games of complete information. Specifically, you will be able to use, where appropriate, dominance, rationalizability, Nash equilibrium, and subgame perfection to predict behavior in games. Additionally, you will be able to analyze static and dynamic games of incomplete information using Bayes-Nash equilibrium and perfect Bayesian equilibrium. You will be able to apply the solution concepts that you have learned to several introductory contracting problems, which include signaling, adverse selection, and the principal-agent problem.

# Required Readings:

Watson (2013), *Strategy: an Introduction to Game Theory*, third edition. ISBN: 978-0-393-91838-0

# Other Information:

1. The Disability Resource Center (DRC) collaborates with university faculty to provide inclusive learning environments. If you have a disability and plan to utilize academic accommodations, additional information may be found in the DRC’s website: drc.fiu.edu.
2. Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and to honestly demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Student Conduct and Honor Code procedures and sanctions as outlined in the FIU Regulation 2501 and the Student Handbook.

Anyone suspected of academic misconduct will be reported to Student Conduct and Academic Integrity. This is to follow University procedures and it ensures appropriate due process. Penalties, if found guilty, could include a grade of an F for the course. Please see https://dasa.fiu.edu/all-departments/studentconduct-and-academic-integrity/index.html and the Student Handbook for more information.

1. Per University policy number 300.010, Instructors retain the right to modify the course syllabus for any reason throughout the semester provided that: • Fair and adequate notice is given to enrolled students either by e-mail, in writing, or through online publishing.

• Modifications to the syllabus are not arbitrary or capricious. • Students are not unfairly disadvantaged by mid-semester changes to grading standards, attendance standards, or performance measures.

1. Students are encouraged to employ critical thinking and to rely on data and verifiable sources to interrogate all assigned readings and subject matter in this course as a way of determining whether they agree with their classmates and/or their instructor. No lesson is intended to espouse, promote, advance, inculcate, or compel a particular feeling, perception, viewpoint or belief.
2. Please follow University policy and CDC guidelines related to the pandemic.

# Schedule

## Week 1 (week of 8/26): Introduction

Out of class: Watch:

Introduction

Extensive form Read: Ch 1 and 2

Do:

Introduce self in discussion

Ch 2 problems 1, 3, 4, 5

In class: Introduction and extensive form problems

## Week 2 (week of 9/1): Describing Games

Out of class:

Watch:

Normal form games

Beliefs and mixed strategies

Read: Ch 3, 4, and 5 Do:

2-1-1 Post

Week 2 homework

Problems: Ch 3: 1, 3, 5, 7, and Ch 4: 1, 3, 5, 6

In class: Problems on normal form and beliefs/mixed strategies

## Week 3 (week of 9/8): Dominance and Best Response

Out of class:

Watch: Dominance and best response Read: Ch 6 Do:

2-1-1 post

Week 3 homework

Ch 6 problems 1, 3, 5, 6, 7

In class: problems on dominance and best response

## Week 4 (week of 9/15): Rationalizability

Out of class:

Watch:

Rationalizability

Example 5 MT1 F2017

Location example Read: Ch 7 and 8

Do:

2-1-1 post

Week 4 homework

Ch 7: 1, 2, 3 4, 5, 6, 7, 9, and Ch 8: 1, 3, 5, 6

In class: problems on rationalizability

## Week 5 (week of 9/22): Nash Equilibrium

Out of class:

Watch: Nash equilibrium

Read: Ch 9 and 10

Do:

2-1-1 post

Week 5 homework

Strategic journal due 9/21

Ch 9: 1, 2, 3, 7, 8, 9, 10, 13 and Ch 10: 11, 15

Examples: 4 MT1 F2018, 6 MT1 S2017, 3 MT1 F2018, 4 MT1 F2017, 4 MT1

S2017

In class: Nash equilibrium problems

## Week 6 (week of 9/29): Strictly Competitive Games

Out of class:

Watch: Strictly Competitive Games

Read: Ch 12 Do:

2-1-1 post

Week 8 homework

Ch 12: 1, 2, 3, 5

In class: strictly competitive game problems

## Week 7 (week of 10/6): Exam 1

Exam 1 in class on October 11th

## Week 8 (week of 10/13): Mixed-Strategy Nash Equilibrium

Out of class:

Watch: Mixed-Strategy Nash Equilibrium

Read: Ch 11 Do:

2-1-1 post

Week 7 homework

Ch 11: 1, 2, 3, 4, 5, 6, 8, 9, 10, 14, 15

Examples: 5 MT2 F2017, 2 MT2 F2015

Strategic journal due 10/17

In class: mixed-strategy Nash equilibrium problems

## Week 9 (week of 10/20): Backward Induction and Subgame Perfection

Out of class:

Watch:

Backward Induction

Subgame Perfection Read: Ch 14, 15, 16 Do:

2-1-1 post

Week 9 homework

Ch 14: 1, Ch 15: 1, 2, 3, 7, 12, Ch 16: 7

Examples: 3 MT2 F2017, 4 MT2 F2017, 5 MT2 F2010, 5 MT2 S2010

In class: backward induction and subgame perfection problems

## Week 10 (week of 10/27): Repeated Games

Out of class:

Watch:

Two-Period Repeated Games

Infinitely Repeated Games

Read: Ch 22 and 23 Do:

2-1-1 post

Week 10 homework

Ch 22: 1, 2, 3, 5

Example: 1 MT3 F2017

In class: repeated games problems

## Week 11 (week of 11/3): Exam 2

Exam 2 in class on November 7th

## Week 12 (week of 11/10): Bayesian Games and Bayes’ Rule

Out of class:

Watch: Bayes-Nash equilibrium and Bayes’ Rule

Read: Ch 24, 26, 27, and Ch 28 to p. 382 Do:

2-2-1 post

Ch 24: 1, 3, Ch 26: 1, 3, 6, 7

In class: Bayes-Nash equilibrium problems and Bayes’ rule problems

## Week 13 (week of 11/17): Perfect Bayesian Equilibrium

Out of class:

Watch: Perfect Bayesian Equilibrium

Read: Ch 28 and 29 Do:

2-1-1 post

Ch 28: 1, 2, 3, 5, 6, 7, 9 Ch 29: 1, 2, 3, 7, 10

In class: PBE problems

## Week 14 (week of 11/24): Thanksgiving – no class meeting

Please use this week to work on your paper and the major homework/information assignment.

## Week 15 (week of 12/1): Perfect Bayesian Equilibrium

In class: PBE problems and time for discussing papers

## Final Week of Instruction: (week of 12/8)

Submit information assignment – due by 11:59pm 12/4

Paper is due at University-assigned exam time of noon on 12/12