

Game Theory

Dr. Ryan Safner

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Course: ECON 316 Fall 2021

Room: Rosenstock 218

Meets: MW 11:30 AM—12:55PM

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Hours: MW 10:00—11 AM & by appt

Game Theory is a collection of analytical tools used to rigorously study strategic interactions between rational agents. It is one of the most useful and powerful theoretical innovations in 20th century social science, and has been applied extensively in economics, political science, psychology, sociology, logic, computer science, animal behavior, and evolutionary biology. At least twelve economists have won the Nobel Prize for research directly related to game theory (and arguably more have made tangential contributions). This is an *economics* course, so the majority of our focus and applications will be in economic settings, though we will examine a much wider scope of strategic interactions than the “narrow” economic domain of firms and consumers.

Please don't get the wrong idea — this course is *not* the theory of “games” in the colloquial sense (e.g. chess, poker, football, *Fortnite*, etc)! This course is *not* designed to make you a better [insert favorite game] player (but that may be a side effect!). A “game” in social science is defined according to certain technical criteria. Furthermore, formal game theory is *highly abstract and very mathematical*. I will try to balance formal theory with interesting real world applications, sometimes including colloquial “games.”

Game theory is a direct extension of basic microeconomics, so this class assumes you have met the **required prerequisite course(s) — ECON 206**. My approach to game theory requires *some* math, but it will not be exclusively about the math.

1 Course Format and Covid

As of Fall 2021, all students are expected to be on campus except those with special approved exemptions. As such, this course will be taught **in-person** and **synchronously** until or unless otherwise announced.

You are expected to come to class except due to medical reasons or other legitimate conflicts. Watching videos are not a substitute for attending class.¹ Please see the **attendance policy** for more.

In any event that we are unable to meet in person, I will hold class meetings at the same day/time live on Zoom, and post all recorded lectures via Panopto on Blackboard, and all assignments will be submitted online (often via Blackboard).

1.1 Learning During a Global Pandemic

While we have made some progress in returning to normal, this remains a unique semester and a lot of things are still awful right now. None of us signed up for this. None of us are really okay, we're all just pretending for everyone else.

Many of you may be dealing with hardships at home and at work, and are generally juggling many more problems than usual. Everyone's future plans have been completely put on hold or cancelled to a large degree.

I am prioritizing us supporting each other as human beings during this crazy era, and will try to use simple, accessible solutions that make sense for the most people, and above all, to be flexible.

If you tell me you're having trouble, I will do whatever I can to help, and not judge you or think less of you. I hope you will extend me the same courtesy.

¹On average, even for students who complete all assignments, those that do not regularly attend class suffer by a full letter grade, ([Levitt 1993](#)).

You never owe me personal information about your health (mental or physical). You are however always welcome to talk to me about things that you're going through. If I can't help you, I usually know somebody who can.

I want you to learn a lot from this course, but it is more important for you to remain healthy, balanced, and grounded during this crisis.

2 Course objectives

By the end of this course, you will:

- Recognize different types of strategic interactions across different domains (e.g. economics, business, political science, biology, etc.)
- Recognize common types of games, e.g. prisoners' dilemma, stag hunt, battle of the sexes, chicken, hawk-dove
- Solve for equilibria of games in normal form, extended form, in pure & mixed strategies, with perfect and imperfect information
- Understand the role of information, sequencing, credible commitments, repetition, etc.
- Become familiar with some of the economics (and other) literatures that use game theoretic tools
- Use game theory tools to explore a topic in writing

Given these objectives, this course fulfills all three of the learning outcomes for [the George B. De-laplaine, Jr. School of Business](#) Economics B.A. program:

- Use quantitative tools and techniques in the preparation, interpretation, analysis and presentation of data and information for problem solving and decision making [...]
- Apply economic reasoning and models to understand and analyze problems of public policy [...]
- Demonstrate effective oral and written communications skills for personal and professional success[...]

Fair warning: **Economics is hard.** *This, in particular, may be of the hardest courses that you will take, primarily due to the mathematical content.* Using the economic way of thinking is a skill, it is literally retraining your brain to interpret and analyze the world in a novel way, and is not something that can be memorized. I will do my best to make this class intuitive and helpful, if not interesting. If at any point you find yourself struggling in this course for any reason, please come see me. Do not suffer in silence! Coming to see me for help does not diminish my view of you, in fact I will hold you in *higher* regard for understanding your own needs and taking charge of your own learning. There are also some fantastic resources on campus, such as the [Center for Academic Achievement and Retention \(CAAR\)](#) and the [Beneficial-Hodson Library](#).

See my [tips for success in this course](#).

I reserve the right to change any part of this syllabus and course, at my discretion, with proper advance warning.

3 Required Course materials

You can find all course materials at my **dedicated website** for this course: gameF21.classes.ryansafner.com. Links to the website are posted on our Blackboard course page. Please familiarize yourself with the website, see that it contains this [syllabus](#), guides for your [reference](#), and our [schedule](#). On the schedule page, you can find each module with its own class page (**start there!**) along with all related readings, lecture slides, practice problems, and assignments.

My lecture slides will be shared with you, and serve as your primary resource, but our main "textbook" below is **recommended** as the next best resource and will be available from the campus bookstore. I will discuss more about textbooks and materials in the first module.

Grade	Range	Grade	Range
A	93–100%	C	73–76%
A–	90–92%	C–	70–72%
B+	87–89%	D+	67–69%
B	83–86%	D	63–66%
B–	80–82%	D–	60–62%
C+	77–79%	F	< 60%

3.1 Books

My lecture slides (made available to you) are the primary resource for the material and the best guide to prepare for homeworks and exams. There are two books that we will roughly be following in parallel, both available at the bookstore (or you can find them on Amazon, ebay, etc). You may choose to purchase used or old versions, but be aware that content and ordering may slightly vary across versions.

1. Dixit, Avinash K and Barry J Nalebuff, 2008, *The Art of Strategy: A Game Theorist's Guide to Success in Business and Life*, New York: W.W. Norton and Company
2. Dixit, Avinash K, Susan Skeath, and David H Reily Jr, 2014, *Games of Strategy*, 4th ed, New York: W.W. Norton and Company
3. Purchase a Moblab account (\$10) at moblab.com

The first book is a popular, read-on-the-beach style paperback that covers the topics in a readable way. It is listed as **required** in the bookstore, and should be fairly cheap on Amazon. It mirrors the topics in the next book in roughly the same order but certainly at a more general (and less mathematical) manner.

The second book is the more common textbook-style. As with any textbook, this will be more expensive but a deeper dive into the material that may help with your understanding. It is listed as **recommended** in the bookstore.

If you purchase the second book, it is superfluous for you to purchase the first book, unless you really would like to!

Finally, purchase an account on moblab.com so that we can all play games in class together on common software.

I leave it to you to determine your own optimal strategy in purchasing (or not) any textbooks. There is no dominant strategy here.

4 Assignments and Grades

Your final course grade is the weighted average of the following assignments. You can find general descriptions for all the assignments on the [assignments page](#) and more specific information and examples on each assignment's page on the [schedule page](#).

Frequency	Assignment	Weight
n	Homeworks	25% (using average HW grade)
1	Paper	25%
1	Midterm Exam	25%
3	Final Exam	25%

Each assignment is graded on a 100 point scale. Letter-grade equivalents are based on the following scale:

See also my [Grade Calculator](#) app where you can calculate your overall grade using existing assignment grades and forecast “what if” scenarios.

These grades are firm cutoffs, but I do of course round upwards (≥ 0.5) for final grades. A necessary reminder, as an academic, I am not in the business of *giving* out grades, I merely report the grade that you *earn*. I will not alter your grade unless you provide a reasonable argument that I am in error (which does happen from time to time).

No extra credit is available

5 Policies and Expectations

This syllabus is a contract between you, the student, and me, your instructor. It has been carefully and deliberately thought out², and I will uphold my end of the agreement and expect you to uphold yours.

In the language of game theory, this syllabus is my commitment device. I am a very understanding person, and I know that exceptions to rules often need to be made for students. However, to be *fair* to *all* students the syllabus artificially constrains my ability to make exceptions at a whim for anyone. This prevents clever students from exploiting my congenial personality at everyone else's expense. Please read and familiarize yourself with the course policies and expectations of you. Chances are, if you have a question, it is answered herein.

5.1 Attendance

Your day-to-day classroom attendance is not graded. My philosophy is that you are all adults and must take ownership of your own learning or else you will not succeed. Some assignments may require in-class participation for credit, and an (unexcused) absence may be detrimental to your grade. Attending class is one of the strongest predictors of success.

However, as required under Hood College's "Promise of Fall Plan," (Ch. 2-C) **your classroom attendance will be recorded at every class meeting.** This is primarily to facilitate contact tracing.

If you know you will be absent, you are not *required* to let me know, but it is polite to give notice (Note if I do not reply to an email of yours letting me know, I am probably busy but will still see it and appreciate your email). Your absence will be noted and recorded for the purposes stated above. If, however, we have an assignment due in class, you *must* notify me ahead of time in order to make alternate arrangements to still receive credit. Hasty ex-post attempts to notify me will generate little sympathy.

5.2 Late Assignments

I will accept late assignments, but will subtract a specified amount of points as a penalty. Even if it is the last week of the semester, I encourage you to turn in late work: some points are better than no points!

Homeworks: If you turn in a homework after it is due but before it is graded or the answer key posted, I generally will not take off any points. However, **if you turn in a homework after the answer key is posted, I will automatically deduct 15 points (so the maximum grade you can earn on it is an 80).**

Exams: If you know that you will be unable to complete an *in-class exam* as scheduled for a legitimate reason, please notify me at least *one week* in advance, and we will schedule a make-up exam date. Failure to do so, including desperate attempts to make arrangements only *after* the exam will result in a grade of 0 and little sympathy.

Papers: Starting at the deadline, I will take off 1 point for every hour that your assignment is late.

I reserve the right to re-weight assignments for students whom I believe are legitimately unable to complete a particular assignment.

5.3 Grading

I will try my best to post grades on Blackboard's Grading Center and return graded assignments to you within about one week of you turning them in. There will be exceptions. Where applicable, I will post answer keys once I know most homeworks are turned in (see Late Assignments above for penalties). Blackboard's Grading Center is the place to look for your most up-to-date grades. See also my [Grade Calculator](#) app where you can calculate your overall grade using existing assignment grades and forecast "what if" scenarios.

²A syllabus can and will be used as a legal document for disputes tried at a court of law. Ask me how I know.

5.4 Communication: Email, Slack, and Virtual Office Hours

Students must regularly monitor their **Hood email accounts** to receive important college information, including messages related to this class. Email through the Blackboard system is my main method of communicating announcements and deadlines regarding your assignments. **Please do not reply to any automated Blackboard emails - I may not receive it!** My Hood email (safner@hood.edu) is the best means of contacting me. I will do my best to respond within 24 hours. If I do not reply within 48 hours, do not take it personally, and *feel free to send a follow up email* in the very likely event that I genuinely did not see your original message.

Our [slack channel](#) is available to all students and faculty in Economics and Business. I have invited all of my classes and advisees. It will not be extended to non-Business/Economics students or faculty. All users must use their **hood emails** and **true first and last names**. Each course has its own channel, exclusive for verified students in the course, and myself, by my invite only. As a third party platform, you agree to its Terms of Service. I have created this space as a way to stay connected, to help one another, and to foster community. Behaviors such as posting inappropriate content, harassing others, or engaging in academic dishonesty, to be determined solely at my discretion, will result in one warning, the content will be deleted, and subsequent behavior will result in a ban.

In addition to in-person office hours, you can also make an appointment for **“office hours”** on Zoom. You can join in with video, audio, and/or chat, whichever you feel comfortable with. Of course, if you are not available during those times, we can schedule our own time if you prefer this method over email or Slack. If you want to go over material from class, please have *specific* questions you want help with. I am not in the business of giving private lectures (particularly if you missed class without a valid excuse).

Watch the excellent and accurate video explaining office hours [on the website](#).

5.5 Netiquette

When interacting with classmates and with your instructor online (e.g. Zoom, Slack, etc.) please follow appropriate internet etiquette (“Netiquette”). Written communications lack important nonverbal cues (such as body language, tone of voice, sarcasm, etc).

Above all else, please respect one another and think/reread carefully about how others may see your post before you submit a comment. You are expected to disagree and have different opinions, this is inherently valuable in a discussion. Please be civil and constructive in responding to others’ comments: writing *“have you considered ‘X?’* is a lot more helpful to all involved than just writing *“well you’re just wrong.”*

Posting content that is willfully incendiary, illegal, or that constitutes academic dishonesty (such as plagiarism) will automatically earn a grade of 0 and may be elevated to other authorities on campus.

When using the chat function, please treat it as official course communications, even though I may not be grading it. It may be a quick and informal tool - don’t feel you need to worry about spelling or perfect grammar - but please try to avoid *too* informal “text-speak” (i.e. say “That’s good for you” instead of “thas good 4 u”).

5.6 Privacy

[Maryland law requires](#) all parties consent for a conversation or meeting to be recorded. If you join in, and certainly if you participate, **you are consenting to be recorded**. However, as described below, videos are *not accessible* beyond our class.

Live lectures are recorded on Zoom and posted to Blackboard via Panopto, a secure course management system for video. Among other nice features (such as multiple video screens, close captioning, and time-stamped search functions!), Panopto is authenticated via your Blackboard credentials, ensuring that *our course videos are not accessible to the open internet*.

For the privacy of your peers, and to foster an environment of trust and academic freedom to explore ideas, **do not record our course lectures or discussions**. You are already getting my official copies.

The [Family Educational Rights and Privacy Act](#) prevents me from disclosing or discussing any student information, including grades and records about student performance. If the student is at least 18 years

of age, *parents (or spouses) do not have a right to obtain this information*, except with consent by the student.

Many of you may be tuning in remotely, living with parents, and may have occasional interruptions due to sharing a space. This is normal and fine, but know that I will protect your privacy and not discuss your performance when parents (or anyone other than you, for that matter) are present, without your explicit consent.

5.7 Enrollment

Students are responsible for verifying their enrollment in this class. The last day to add or drop this class with no penalty is **Wednesday, September 1**. Be aware of [important dates](#).

5.8 Honor Code

Hood College has an Academic Honor Code which requires all members of this community to maintain the highest standards of academic honesty and integrity. Cheating, plagiarism, lying, and stealing are all prohibited. All violations of the Honor Code are taken seriously, will be reported to appropriate authority, and may result in severe penalties, including expulsion from the college. See [here](#) for more detailed information.

5.9 Van Halen and M&Ms

When you have completed reading the syllabus, email me a picture of the band Van Halen and a picture of a bowl of M&Ms. If you do this *before* the date of the first exam, you will get bonus points on the exam. If 75-100% of the class does this, you each get 2 points. If 50-75% of the class does this, you each get 4 points. If 25-50% of the class does this, you each get 6 points. If 0-25% of the class does this, you each get 8 points. Yes, you read this correctly.

5.10 Accessibility, Equity, and Accommodations

College courses can, and should, be challenging and bring you out of your comfort zone in a safe and equitable environment. If, however, you feel at any point in the semester that certain assignments or aspects of the course will be disproportionately uncomfortable or burdensome for you due to any factor beyond your control, please come see me or email me. I am a very understanding person and am happy to work out a solution together. I reserve the right to modify and reweight assignments at my sole discretion for students that I believe would legitimately be at a disadvantage, through no fault of their own, to complete them as described.

If you are unable to afford required textbooks or other resources for any reason, come see me and we can find a solution that works for you.

This course is intended to be accessible for all students, including those with mental, physical, or cognitive disabilities, illness, injuries, impairments, or any other condition that tends to negatively affect one's equal access to education. If at any point in the term, you find yourself not able to fully access the space, content, and experience of this course, you are welcome to contact me to discuss your specific needs. I also encourage you to contact the [Office of Accessibility Services](#) (301-696-3421). If you have a diagnosis or history of accommodations in high school or previous postsecondary institutions, Accessibility Services can help you document your needs and create an accommodation plan. By making a plan through Accessibility Services, you can ensure appropriate accommodations without disclosing your condition or diagnosis to course instructors.

6 Tentative Schedule

You can find a full schedule with much more details, including the readings, appendices, and other further resources for each class meeting on the [schedule page](#).