

PS 231

Strategic Models  
U.I.U.C. CRN 59988

Fall 2025

*to thy happy children  
of the future  
those of the past  
send greetings*



# THE VERY BASICS

## MEETINGS

 <b>Time:</b>	Monday & Wednesday 10:00–10:50 C.S.T.
<b>Place:</b>	Zoom
<b>Instructor:</b>	Rob Carroll [professor]
 <b>Email:</b>	RJC@ILLINOIS.edu
<b>Office:</b>	Zoom
<b>Office Hours:</b>	Wednesday, 13:00–16:00 C.S.T.

## RECITATION

 <b>Time:</b>	Friday [it depends on your section!]
<b>Place:</b>	[also section-dependent]
<b>Instructor:</b>	Myla Burton [teaching assistant]
 <b>Email:</b>	mburto01@ILLINOIS.edu
<b>Office:</b>	T.B.D.
<b>Office Hours:</b>	T.B.D.

## TWO SIDE POINTS ON MATTERS OF DECORUM

**1** Though Myla and Rob will be playing [very] different roles in this course, it is expected that you will treat them precisely the same way. In other words, the “professor” and “T.A.” labels do not matter for purposes of class decorum. Any courtesies you would extend to one must apply to the other. [*Woe betide the student that disrespects the T.A.*]

**2** You are allowed [encouraged, even] to refer to the staff on a first-name basis. If you prefer, last names are also acceptable. You are reminded that the equal-decorum point raised above applies here, and you are encouraged to reflect on whether your professional habits of courtesy and decorum apply equally to all instructors/teaching staff, irrespective of their *prima facie* traits. Seriously: check yourself before you wreck yourself.

LIFE WITHOUT INDUSTRY IS GUILT;  
INDUSTRY WITHOUT ART IS BRUTALITY.

# CONTENT

PS 231 will introduce you to **GAME THEORY** and its applications in political science. You may well be wondering: why should I learn about game theory? [It's a good question.] A few answers come to mind:

1. Political science majors who intend to take advanced substantive seminars will want to understand just what is happening in the game-theoretic articles they've been assigned. Game theory is a popular method in political science, and many literatures within the discipline rely on it heavily.
2. Studying game theory is a good way to learn some of the most important concepts in our field—concepts that emerge in both game-theoretic and non-game-theoretic conversations. The *method* of game theory helps one learn about the *substance* of politics by shedding light on key ideas.
3. Most flavors of game theory impose one form of a *rationality* postulate or another. Rationality is an interesting and controversial topic in its own right.
4. Game theory can help you learn how to make a logical argument.
5. Game theory is very straightforward to do once you overcome the initial annoying obstacles. [Read: despite its charms, this is *not* an easy topic.]

Now, consider the final point raised above: I just used the verb “**DO**”, instead of the verb “**KNOW**”, to describe game theory. In other words, PS 231 isn't “about” anything in the sense that you will not be learning terms or the names of things. Instead, the goal here is to help you learn how to do game theory. Even if you never do game theory again [a likely contingency!], you will have gained something from the exercise: insight, confidence, **CREATIVITY**, and so on. You may also have a better sense about what kind of other political science classes you'd like to try.

But more than anything, you should learn to do game theory because it is **FUN**. That may seem like a childish motivation to learn something. [Maybe it is childish—*so what?*] The best way to learn something is to love learning so much that it becomes fun to you. Remember, after all, that the English word “philosophy” is adopted from the Greek *φιλοσοφία*, which literally translates to “love of **WISDOM**.” [*φιλο* = “philo” = “love”; *σοφία* = “sophis” = “wisdom”.] We put a lot of stock in the “wisdom” part, but don't you think it's equally important—if not moreso—that we **LOVE** the wisdom we work so hard to acquire, and indeed even the tools we use to acquire it? That love can take many forms: we may feel gratitude for the technology that helps sustain us, and thus for the wisdom acquired for developing that technology; we may feel wonder toward the scale of the universe, and thus toward the wisdom acquired in learning about that scale; or, we might just relish the thoughts we're thinking as we're thinking them.

[I hope you learn many interesting things, make at least a few friends, and have a lot of fun in the process.]

Right now some of you are like “jeez loutise is this guy going to blaviate like this all the time?!” I'm afraid so. You'll adjust to it. Or not. Either way, really.

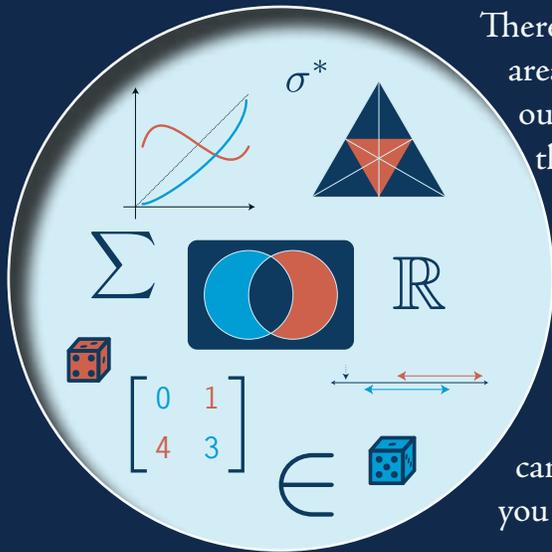


# MORE SPECIFICS

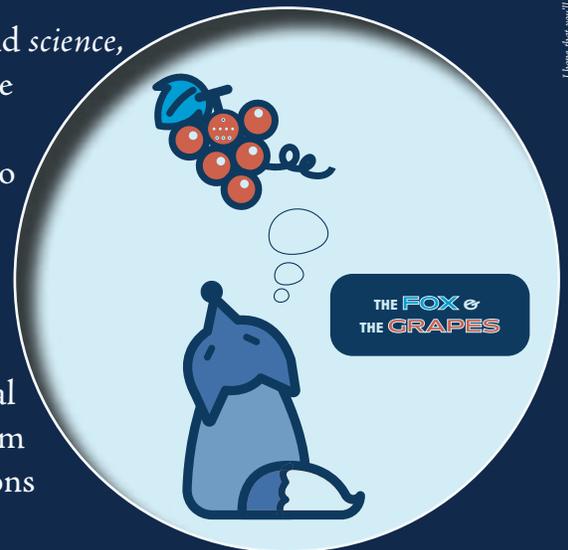
The syllabus window-shoppers will be nonplussed with the previous page, as they'll want to know what **GAME THEORY** is so as to decide whether to drop. Moreover, it is not lost on me that many of you are political science majors and that political science majors often care about politics. So, just to set matters straight: game theory is the rigorous study of strategic interdependence, and it provides a wonderful way to learn about many aspects of politics. We will cover models related to voting, war, trade, legislatures, choice, poker, juries, campaigns, going to college, parties, and sanctions. I won't pretend that we will hit any of these topics with any kind of substantive depth, though I'm happy to direct you to substantive sources on any given topic as we cover it. By the end of the course, you will have learned a little about a lot of processes, and hopefully a lot about how to think, to boot.



There is a cost to learning a method that covers many different substantive areas of interest: we will be working at a level of abstraction that is likely outside your experience to this point. I say “level of abstraction” because that's how it feels to me after doing this a while, but if you're anything like I was at your stage, then you'll probably experience it as a “crap on a cracker nobody told me you can use math to think about politics” kind of thing. I don't want to lead you astray, so to be as clear as possible: for many of you, this will feel like a math class first, second, and third. It is not lost on me that this introduces some anxiety for a typical political science major, and there's not much I can say to comfort you save for “it's really nothing much past the algebra you did in high school” and “we will work hard to be patient and positive and even empathetic with you during your inevitable growing pains.”



The whole of *political science* is [much] more than the sum of *politics* and *science*, so I don't want you to see the two previous windows as exhaustive. The window I love best is neither the politics window nor the science window: it is the **FABLES** window. By week two or so, you will begin to see that game theory is a way to **TELL POLITICAL STORIES** to one another in a principled way—and in a way that can yield unexpected conclusions, no matter the author's attempt at analytic control. If you manage to look at things from just the right angle, then you stand a chance of seeing the seemingly-sterile, seemingly-isolated mathematical models we'll be showing you as a genuine book of fables: a compendium of simple, memorable vignettes that can teach important political lessons while conveying meaning in a scientifically-useful way. So *there's that*.



# PROCEDURE

PS 231 features a **FLIPPED CLASSROOM**. Here's how it works:

1. I'll drop the fresh **PROBLEM SET** on the Saturday prior to a week.
2. Over the weekend, watch that week's **LECTURE VIDEO** and skim/begin to attempt its problem set. You can start to ask questions about either the video or the problem set on **CANVAS**.
3. We'll meet Mondays and Wednesdays on Zoom. These sessions will largely be Q&A. You can ask questions by dropping them in the Zoom chat or using the "raise your hand" feature.
4. You and Myla will meet for recitation on Fridays. In a perfect world, you'll use that time to handle the final details for your writeup.
5. Your writeup is due [via **CANVAS**] by 23:59 C.S.T. on Saturday. Late problem sets cannot be submitted via Zoom (see the Late Work policy in a few pages).

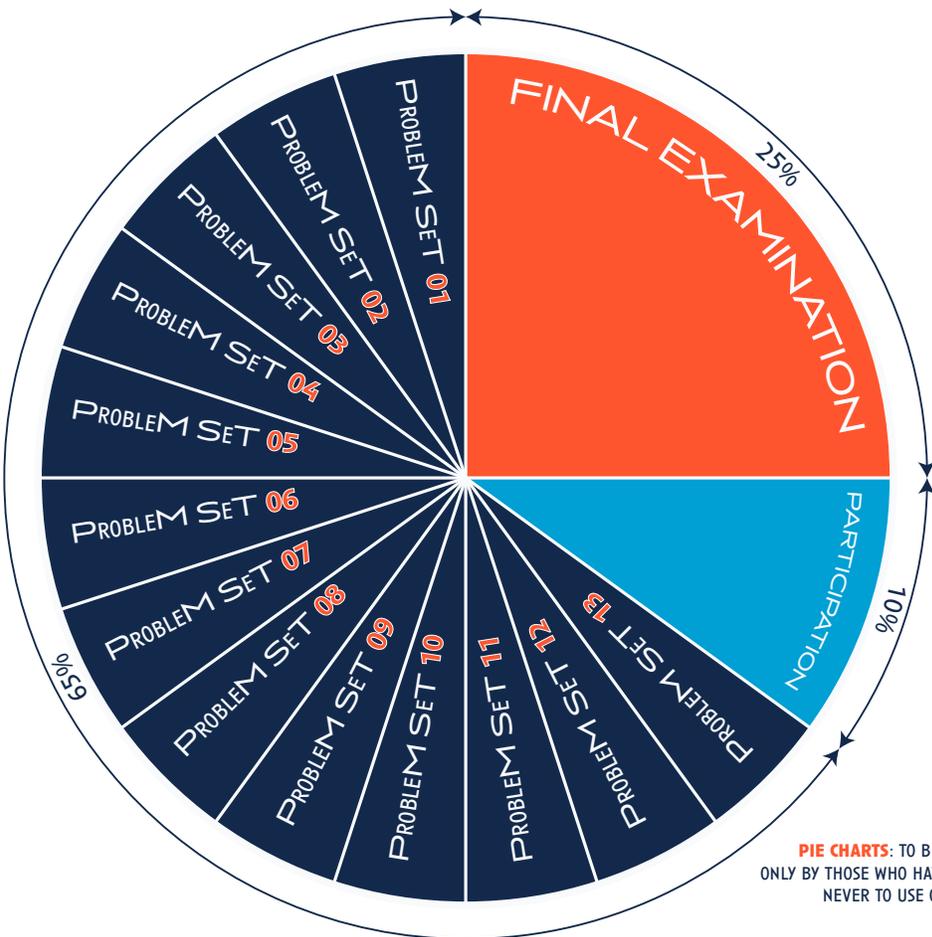


Lather, rinse, repeat—we will do this fifteen times. Yes, fifteen times. Yes, there are fifteen problem sets. Just **BE COOL**. Yes, you can drop some of the problem sets. I'll get to that in a second.

## **i** A WEEK IN THE LIFE OF A PS 231 STUDENT

SAT	SUN	MON	TUE	WED	THU	FRI	SAT
17:00 C.S.T. PROBLEM SET DROPPED ON <b>CANVAS</b> !	ASK QUESTIONS ON <b>CANVAS</b> !	10:00 C.S.T. ASK QUESTIONS ☹️ <b>MEETING 1!</b>	ASK QUESTIONS ON <b>CANVAS</b> !	10:00 C.S.T. ASK QUESTIONS ☹️ <b>MEETING 2!</b>	ASK QUESTIONS ON <b>CANVAS</b> !	ASK QUESTIONS ☹️ <b>RECITATION!</b>	23:59 C.S.T. WRITEUP DUE ON <b>CANVAS</b> !
	STILLERS	BAKING CHAMPIONSHIP		THE MASKED SINGER			SLEEP?

# EVALUATION



**PIE CHARTS:** TO BE USED  
ONLY BY THOSE WHO HAVE LEARNED  
NEVER TO USE ONE



In short, your grade will arise from three sources:

1. 65% stems from weekly **PROBLEM SETS**. You will be able to drop 2 of these. In other words, each recorded problem set is worth 5% of your grade.
2. 10% stems from **PARTICIPATION**. Your score depends on your [you guessed it!] participation.
3. 25% stems from the **FINAL EXAM**, which is scheduled for Friday, May 9 from 19:00—22:00. The final is open-book, open-note, closed-tech.

We will discuss these in turn.

**FOR OFFICE  
USE ONLY**



# PROBLEM SET

Each week, you will receive a **PROBLEM SET** designed to test your understanding of the week's concepts, your ability to apply said concepts to new problems, and your ability to convey abstract results through clear writing. We will spend much of our meeting time discussing the problem sets, so you'll have plenty of chances to work on them with the instructional staff and with your classmates.

All problem sets are graded on a **PASS-FAIL** basis. You'll be given specific passing criteria each week, but in broad brushstrokes, the bar to pass will be reasonably high. That isn't because I enjoy being a jerk—though to be fair, that's what I'd say if I did indeed enjoy being a jerk. Rather, it's because we need to make sure you're accumulating the knowledge and skills it will take to continue passing the problem sets later on in the semester.

The problem set component of your final grade depends on how many problem sets you manage to pass. To earn full credit in the problem set component, you'll need to pass at least thirteen problem sets. Passing fourteen will get you an extra three **ALMA**s, and passing all fifteen gets you five **ALMA**s.

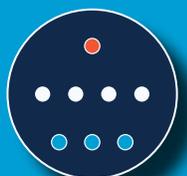
Each problem set is also an opportunity to earn **ALMA**s through excellent performance. **ALMA**s may be used three ways:

1. For five **ALMA**s, you may buy the right to re-submit a failed problem set to earn a pass;
2. For fifteen **ALMA**s, you may purchase a pass, effectively allowing you to drop an additional problem set; and
3. For twenty-five **ALMA**s, you may eliminate one of the five sections of your final examination without penalty.

**ALMA**s may not be exchanged beyond these three avenues, and I reserve the right to rescind **ALMA**s for particularly unmeritorious behavior.

I have allowed the possibility that **YOU MAY NOT NEED TO TAKE THE FINAL EXAM**, though you'd need at least 125 **ALMA**s at your disposal. In that *incredibly* unlikely contingency, we will have far bigger concerns on our hands, like how I'm going to make you President, or something like that.

*Since the problem sets take up sixty-five percent of your final grade, this means that each problem set is essentially a chance to knock out five percent of your grade.*





# Χαίρε!

Hello, my friend. I write you from my half-finished office at the half-finished Olympian Academy on the half-finished island that is the Olympian Prytaneion. The Academy was meant to live at the very center of the island, just next to the Olympian Assembly and the Hall of Justice and all the other half-empty buildings for the half-finished world government. As the island has been half-finished since my arrival here twenty years ago—indeed, much longer than that—my building sits along the artificially-straight coastline that forms the boundary between done and undone. This is not a complaint: after all, not every lecturer gets to have an ocean view, and my little Laelaps loves to bark at the seagulls as they perch on the rooftops just outside my window. There is nothing half-finished about his bravery; he thinks himself fearsome as Cerberus!

It is a strange day. My mentor and some shady-looking technocrats from next door visited the office with a task far beyond my capabilities. The powers that be have decided that any chance of finishing the Olympian Prytaneion relies on—how did they put it? let me see—“**A MORE COMPLETE UNDERSTANDING OF POLITICAL PROCESSES AND WORLD AFFAIRS, ALL IN THE NAME OF BETTER UNDERSTANDING OUR PAST, BETTER INTERPRETING OUR PRESENT, AND BETTER FORESEEING OUR FUTURE.**” My goodness! How terrifyingly flattering! What could a humble lecturer of politics from a half-finished corner of Olympia do to help with such a titanic quest? The technocrats were quick to report that that real academics from the more prestigious academies in Pallassa and Herania and mainland Hestallum had already turned down the job. So much for flattery.

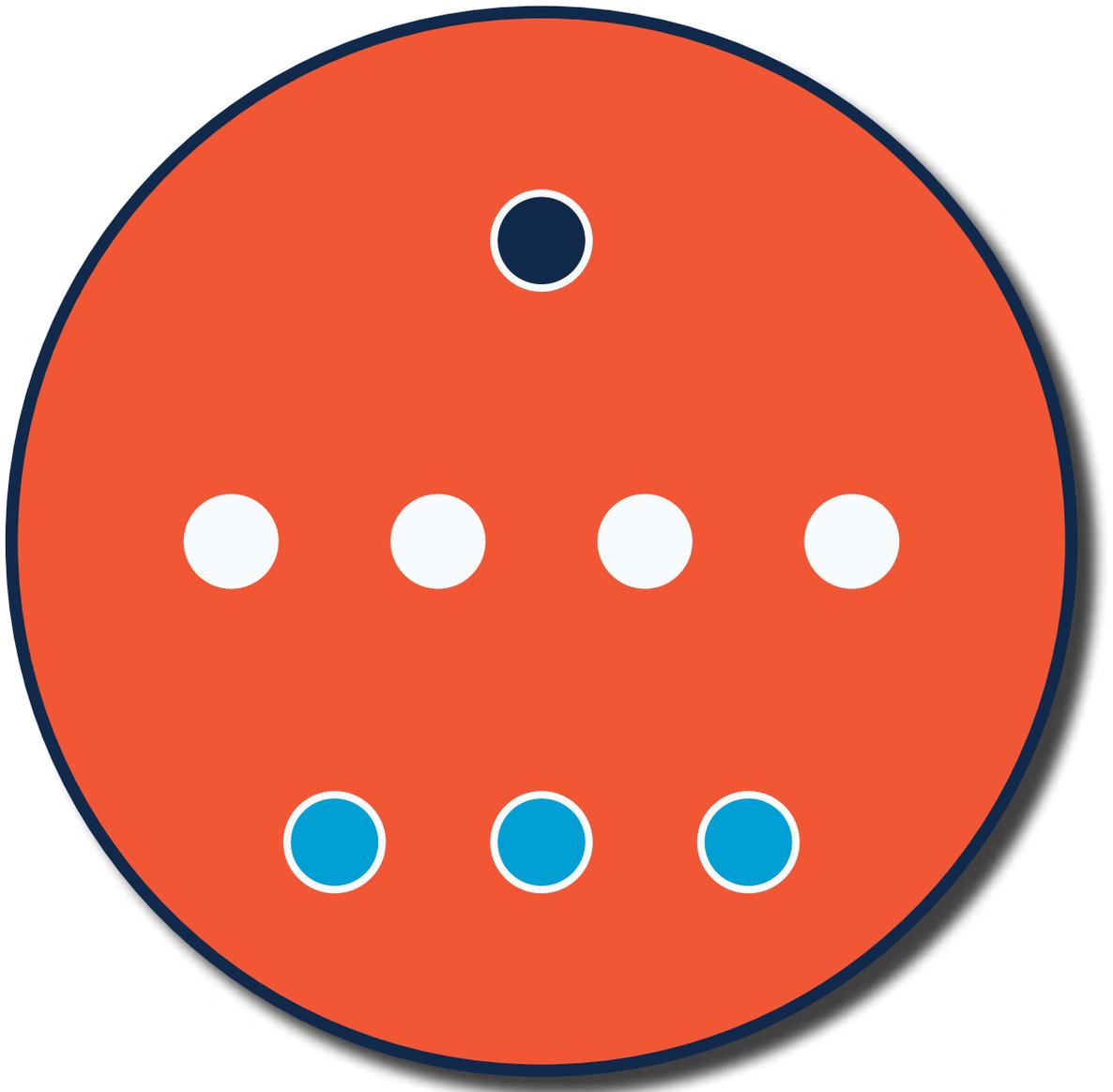
Before I could decline, the technocrats dumped a mountain of files and a portable computer on my desk. There is no time for this! My book still needs to be revised; my classes still need to be taught; my mentor’s ego still needs to be stroked. The technocrats vanished before the pleas left my lips, and my mentor gave me a look indicating that she lacked the authority to intervene on my behalf. As she departed, her final words of reassurance were “the book wasn’t that good, anyway.” As if you would know quality when you saw it, technocrat-in-waiting!

Little Laelaps issued an indignant half-woof to break the silence that now plagued my office. If only he could be of some help, but his job is barking, not thinking. There is nobody else to turn to. I cannot ask you to help me make sense of what just happened; some things transcend simple explanations. It pains me to say this, but I need your help as I execute my perverse task of making sense of the world. The technocrats made no mention of any reward should we somehow succeed, but—if you see things as I do, anyway—the discovery alone will be more than enough compensation for our trouble. Even if we fail, we will learn, and *thus we will have succeeded*. So, my friend: may we strive; may we seek; may we find; and may we never yield. *Χαίρε!*

SOCRATES

*To those of you that just decided to drop:*

**BIE WELL**



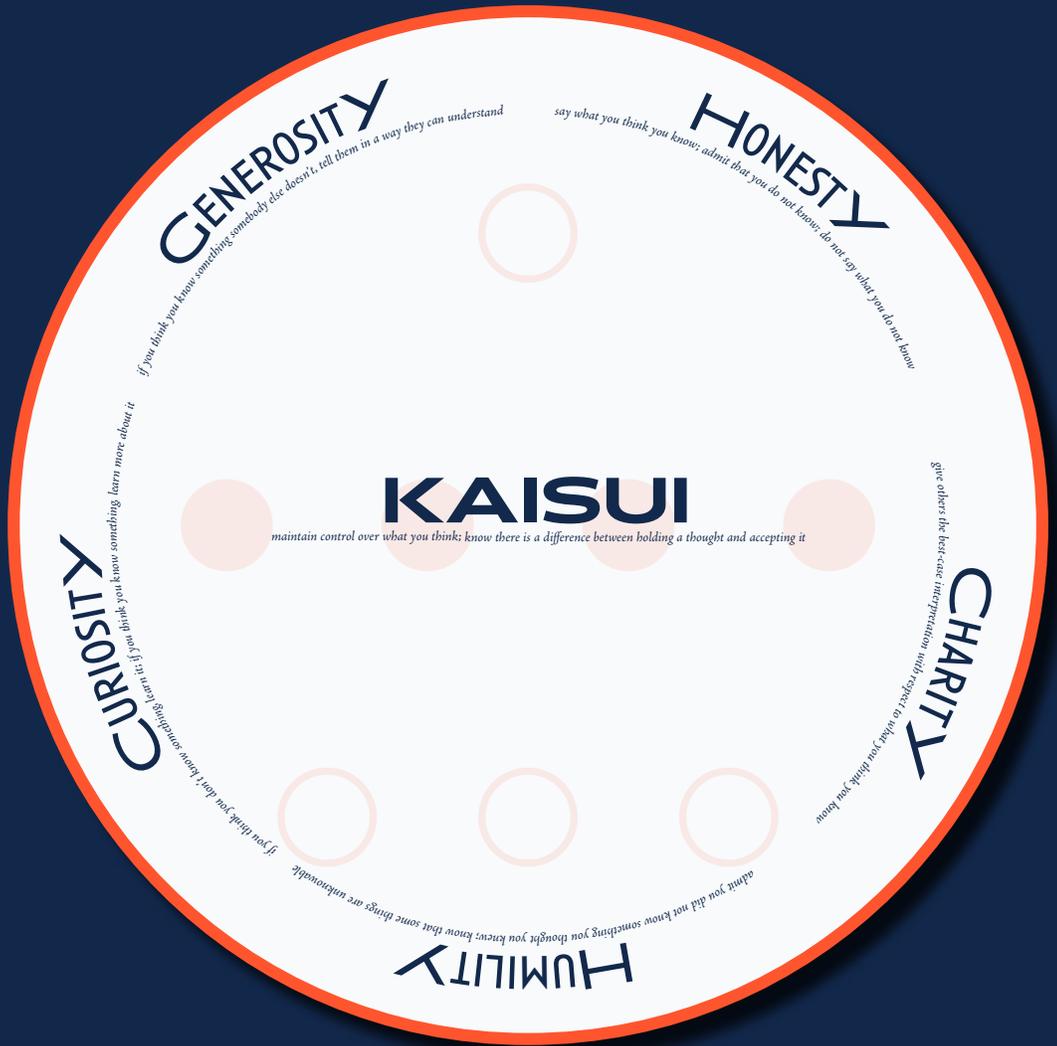


You will also be evaluated on your participation in class. It works like this: at the beginning of the semester, every student begins with a participation grade set at 80%. Whether that goes up, goes down, or stays the same depends on your participation in class.

You'll **RAISE** your participation score by doing things like: showing up to Zoom meetings on time and ready to engage; asking thoughtful questions about the lectures and problem sets (either live on Zoom or *especially* in relevant Canvas discussions); providing thoughtful answers to your classmates' questions; using the chat to add value without derailing; and generally being a net-plus kind of person as it relates to the class. You'll **LOWER** your participation score by doing things like: asking questions with already-recorded answers (including answers in this syllabus); disrespecting your classmates or the T.A. (on Zoom, in chat, or on Canvas); starting an email with the word "hey" without a name; beginning a sentence with "do we have to know..."; and generally being a net-minus kind of person as it relates to the class. And should you do none of these things, nor anything quite like them, then your score will hang right in at 80%.

A good heuristic for evaluating behavior in this class is asking how it rates on the six key **SCHOLARLY VIRTUES**.

You may also earn **ALMA**s by asking great questions in class, by helping answer particularly tricky questions posed by your humble instructor, or by going above and beyond in helping classmates in class or on **CANVAS**.

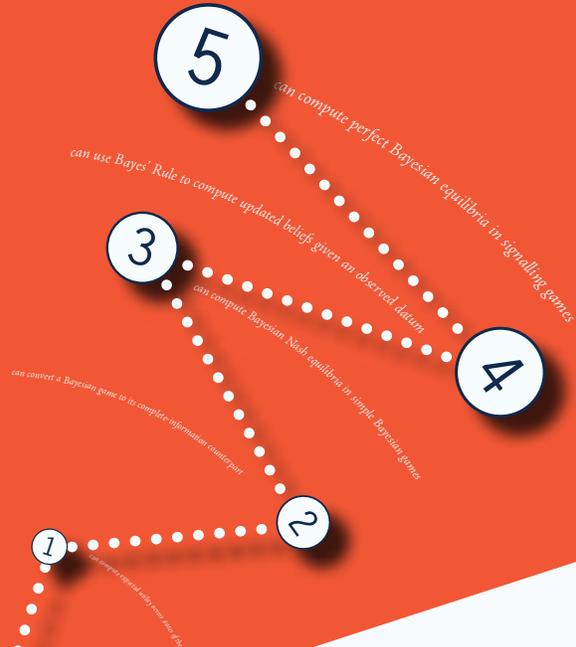
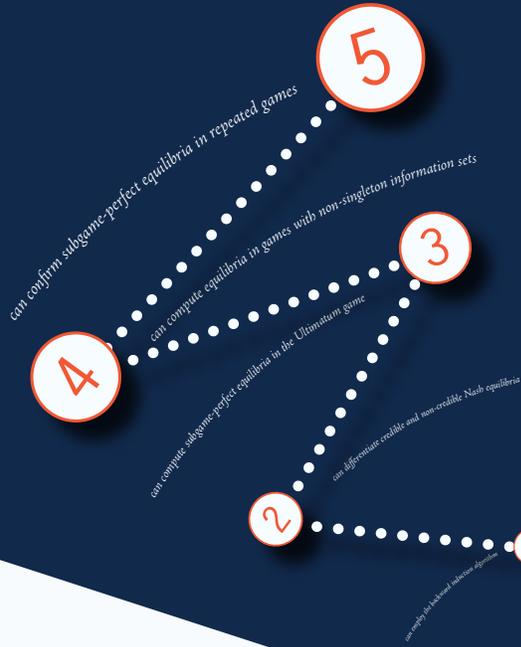




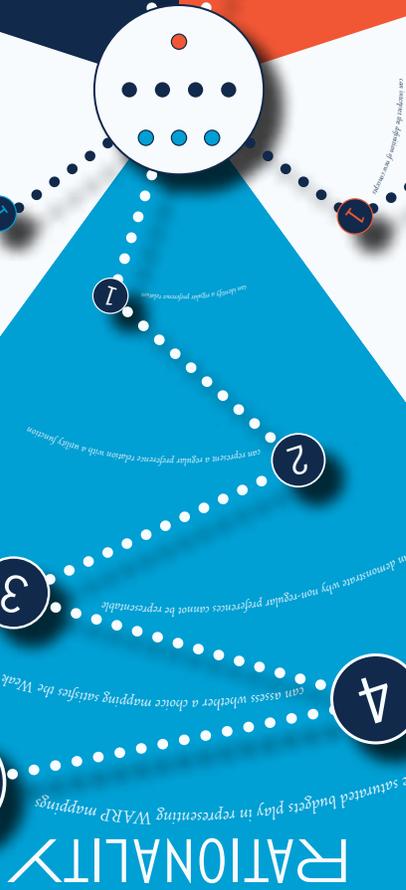
As for the final: it will be in-person and closed to technology [no phones, no laptops, no tablets], but you may use hard copies of notes and problem sets. The final will be in five substantive parts, each worth five points; there may be a curve imposed to map final scores to letter grades. Remember that you may eliminate a section of your final for the bargain price of 25 **ALMA**s.

# SUBGAME PERFECTION

# BAYESIAN EQUILIBRIUM



# NASH EQUILIBRIUM



# WILD CARD

# POLICIES

**LATE WORK:** Since you need only pass 13 problem sets for the problem set component, there is little need for you to let yourself fall behind by scrambling to submit work late. Accordingly, late work will not be accepted. However, since catastrophes do happen from time to time, each student will be given a one-time exception: you may turn one, and only one, of your problem sets in up to 143 hours late, no questions asked. Do so by emailing the T.A. and copying me. On to the next week, as they say. [*Do they say that...?!*]



**ACADEMIC INTEGRITY:** You should familiarize yourself with the [U.I.U.C. Student Code](#), particularly its Article 1, Part 4. For the purposes of this class, the biggest thing is that your writeups must reflect your own work. You are allowed—encouraged, even—to work together, but your submitted writeup must be completely original. If you are unsure as to whether you are abiding this rule adequately, then (1) please feel free to consult with somebody from the teaching staff; and (2) err on the more-demanding-of-your-own-work side. It goes without saying that the final exam will not involve any nefarious behavior. Any violation of this will result in a zero for the course. Not the final. The course. Wait, that doesn't look scary enough. **THE COURSE.**



**ATTENDANCE:** There isn't an attendance policy, other than “don't email teaching staff just to let them know you'll be missing a session.” Good attendance habits [strongly] correlate with good attendance, but (1) good attendance is certainly not sufficient, and probably not necessary, for a good grade; and (2) this is a reverse-causation problem if ever there was one. It is recommended that you attend every meeting you can; we will take steps to record them as much as possible, but flipped classrooms can get a little too chaotic for clear cinematography. You'd do well to form a study group with people you trust to ask good questions and take good notes. [To whichever brave soul winds up starting the inevitable course group chat: please share details publicly in class or on **CANVAS**. It is not lost on this old man that group chats matter a lot in a class like this one, and indeed that you need a chance to teach one another to really flourish.]



**ACCOMMODATION:** You should familiarize yourself with [UIUC's Division of Disability Resources & Educational Services \[D.R.E.S.\] webpage](#), particularly its accommodations page. We are happy to accommodate any student with appropriate D.R.E.S. documentation, which should be submitted to the professor via email in a timely manner [*i.e.*, by the end of the first week of the semester]. If the lecture videos are a poor fit, alternative methods will be devised.

This all sounds very meanspirited, I know, but sadly every syllabus needs a page like this one. Please know, however, that my general policy shall be to (1) view you as a **HUMAN BEING**; (2) act in **GOOD FAITH** with you; (3) assume **GOOD FAITH** on your end until shown otherwise; and (4) assume that you are assuming **GOOD FAITH** from me. So long as we view each other as **RATIONAL ADULTS** capable of coming to an understanding through **HONEST DIALOGUE**, we'll be just fine.



# THE YELLOW BOOK

Look, we won't be taking attendance in class. But, it's still nice to have a little incentive to show up and a ritual to get each meeting started.

To that end, at the start of each meeting, I will read aloud one question from a book called *The Last Unknowns: Deep, Elegant, Profound Unanswered Questions About the Universe, the Mind, the Future of Civilization, and the Meaning of Life* (edited by John Brockman). Here's the Amazon blurb:

*This is a little book of profound questions (only questions!)—unknowns that address the secrets of our world, our civilization, the meaning of life. Here are the deepest riddles that have fascinated, obsessed, and haunted the greatest thinkers of our time, including Nobel laureates, cosmologists, philosophers, economists, prize-winning novelists, religious scholars, and more than 250 leading scientists, artists, and theorists. In The Last Unknowns, John Brockman, publisher of Edge.org, asks "a mind-blowing gathering of innovative thinkers" (Booklist): "What is 'The Last Question,' your last question, the question for which you will be remembered?"*

I'll pick one of these questions, read it aloud once at the start of class, and display it briefly on-screen. You write it down. Then you go home (or, you know, stay home) and write around 500 words on it — that's about two double-spaced pages. You submit your reflection via the Yellow Book Question assignment on Canvas before the next class begins. Do that and you get a Yellow Book Point.

For every four Yellow Book Points, you get one **ALMA**. It might not sound like much, but if you did this every time, you'd get seven **ALMAs**, which gets you the right to re-do a failed problem set (plus change!). Of course, Yellow Book Points might help get you to higher **ALMA** totals, as well, resulting in some of the fancier prizes kicking in. It doesn't hurt to do some Yellow Book Questions.

Some notes:

- ♦ This rewards being in your seat (on Zoom) on time. The question will only be read and displayed once, at the very beginning of class.
- ♦ No emailing or posting answers to Canvas discussions. This defeats the purpose. If you miss one, it's not a huge deal—repeat: *not a huge deal*.
- ♦ These reflections help me get to know how you think, what you find interesting, and how you engage with big ideas. If you ever ask me for a letter of recommendation, they help me personalize it.
- ♦ At the review sesh at the end of the semester, we'll all sign the Yellow Book. It will be presented on the day of the final to the student that's earned the most **ALMAs**.

SUN	MON	TUE	WED	THU	FRI	SAT
 24 week 01: encoding the world	meeting 01-01 25	 26	meeting 01-02 27	 28	recitation 01 29	PS 01 due 30
 31 week 02: rationality	01	 02	meeting 02-01 03	 04	recitation 02 05	PS 02 due 06
07 week 03: uncertainty	meeting 03-01 08	 09	meeting 03-02 10	 11	recitation 03 12	PS 03 due 13
 14 week 04: risk	meeting 04-01 15	 16	meeting 04-02 17	 18	recitation 04 19	PS 04 due 20
21 week 05: optimality	meeting 05-01 22	 23	meeting 05-02 24	25	recitation 05 26	PS 05 due 27
 28 week 06: games	meeting 06-01 29	 30	meeting 06-02 01	 02	recitation 06 03	PS 06 due 04
 05 week 07: equilibrium 1	meeting 07-01 06	 07	meeting 07-02 08	 09	recitation 07 10	PS 07 due 11
12 week 08: equilibrium 2	meeting 08-01 13	 14	meeting 08-02 15	 16	recitation 08 17	PS 08 due 18
 19 week 09: time	meeting 09-01 20	 21	meeting 09-02 22	23	recitation 09 24	PS 09 due 25
26 week 10: perfection	meeting 10-01 27	 28	meeting 10-02 29	 30	recitation 10 31	PS 10 due 01
 02 week 11: repeated games	meeting 11-01 03	 04	meeting 11-02 05	 06	recitation 11 07	PS 11 due 08
 09 week 12: information	meeting 12-01 10	 11	meeting 12-02 12	 13	recitation 12 14	PS 12 due 15
16 week 13: bayesian equilibrium	meeting 13-01 17	 18	meeting 13-02 19	 20	recitation 13 21	PS 13 due 22
 23	24	25 FALL BREAK [no class]	 26	27	28	 29
30 week 14: poker	meeting 14-01 01	 02	meeting 14-02 03	04	recitation 14 05	PS 14 due 06
 07 week 15: you do you my friend	meeting 15-01 08	 09	meeting 15-02 10	11 READING DAY [review sesh]	 12	 13
 14	 15	16 FINALS WEEK [no class]	PS 15 due 17	18 FINAL EXAM [08:00-11:00]	 19	 20

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GOODNESS GRACIOUS IT'S A SECRET POP-UP SYLLABUS QUIZ WHAT A DELIGHT!!!!!!!!!!!!!!!

For one **ALMA**, answer at least 15 of the following questions correctly:

1. What is the Japanese word for seawater? [At least, the one on this syllabus.]
2. What percentage of your grade stems from participation?
3. What is the engraving at the bottom of the Alma Mater statue?
4. How many problem sets may you drop without spending any **ALMA**s?
5. Translate [into English] the Greek word Socrates used twice in his cameo.
6. What's going to be the blackest day of Rob's semester?
7. What is Socrates's charge?
8. How many times does the following emblem appear in this document:  ?
9. I rolled two dice while making this. What did I roll?
10. How many Yellow Book Points get you an **ALMA**?
11. Write the full name of the U.I.U.C. office that manages accommodation requests, among other important functions.
12. Absent special circumstances, should you email the teaching staff to tell them you need to miss a meeting/recitation?
13. What reward awaits those that disrespect the teaching assistant?
14. What is the capital of Poh-Sai-Dan?
15. What can you see through Rob's favorite window?
16. Who penned the quotation from the Very Basics page of the syllabus?
17. What has Rob assumed about you and assumed that you assume about him?
18. For all its saccharine bloat, the syllabus contains only one poem. What is it?
19. What must you be able to do to earn 3 points on the subgame perfection part of your final?
20. What is Rob's most childish argument for learning to do game theory?
21. What all can you do with **ALMA** tokens, and at what rates?
22. What is the T.A.'s email address?
23. On what date will Meeting 09-02 be held?
24. Discuss the etymology of the English word "philosophy." Be concise.
25. What are Rob's plans for you if you earn enough **ALMA**s to skip the final?
26. Enumerate the most essential features of the class late work policy.
27. When is your final exam?
28. What is the formal course number for PS 231 this semester?
29. What is Article 1, Part 4, Section 3 of the U.I.U.C. student code about?
30. What is Rob's favorite show to watch on Wednesday nights?

Get all thirty right and you get a second **ALMA**. Do not ask me about this, whether via email or in person or whatever. Do not mention it at any meeting prior to Meeting 02-01. If you want the **ALMA**s, just put the answers, in some semblance of an order, at the end of your writeup for PS01, and we will handle it.

Finally, you can get a third **ALMA** if you correctly guess what I'm alluding to with the  emblem. No, I will not confirm that your answer is correct or incorrect. Just issue your guess with a brief explanation and be done with it. If you ask me about this further, you are no longer eligible.

Welcome to PS 231. Looking forward to seeing you soon.

RJC

*if you want to work on this with somebody but aren't sure if they know the secret, ask them if they like pineapple on their pizza. if asked if you like pineapple on your pizza, reveal yourself as in on the joke by answering "pineapple pizzas pair perfectly with peppery pinots."*