

Setting expectations: three important facts about this course

This is a course in *formal* reasoning and decision making. You will learn to use symbols and numbers to represent various ways that people actually try to reason in everyday life, and you will learn how to evaluate and criticize their reasoning by evaluating those symbolic and numerical representations. **You should expect this course to feel much like a math course.** There will be problem sets. There will usually be clear-cut correct and incorrect answers to the questions you will be required to answer.

This is also being taught as a *summer* course. We have just six weeks to cover what is usually covered in fifteen weeks. **You should expect this course to feel fast or intense.** In order to pass, you will need to start working right away and work regularly throughout the 6-week duration. In order to do well, you will need to devote about twice as much time per week as you would normally need to devote, if you were taking this as a course during the fall or spring.

Finally, this is an online course. I will be posting videos of myself presenting all the material we would normally cover in person in class. But, in contrast with an in-person class, I will not be able to tell as easily if you are confused or not following. **You should expect to be proactive about reaching out whenever you don't understand something.** Again, since this is like a math class, much of the material is *cumulative*. Each lesson builds on things we already covered. If you ignore something you don't understand, you may struggle with all the material that comes after it, too.

Material to be covered

Most generally: this class will be concerned with the formalization of ways of reasoning and criticism or evaluation of the formal properties of those ways of reasoning. You can think of the class as covering three broad topics:

- **(Deductive) Logic.** We will cover what's known as "sentential" or "propositional" logic. You will learn how to classify valid and invalid arguments, including by using truth tables. (*Week 1-2*)
- **Probability and decision theory.** Most reasoning is not deductive but inductive. E.g., we reason that something-or-other is most likely true because some other fact or piece of evidence suggests that it's probable. We will cover enough probability to be able to evaluate these and similar arguments. We will also discuss how you should (rationally) make decisions, in light of how probable you think various things are. (*Week 3-5*)
- **Heuristics and Biases.** In real life, we don't write down or explicitly consider all of our reasoning. Some reasoning we do quickly and 'automatically.' It's important to recognize how this psychological reality complicates the picture of "good" reasoning we might have if we only considered explicit probabilistic and deductive reasoning. (*Week 6*)

Core Curriculum Goals: QQ or QR

The course meets core curriculum goals QQ (Formulate, evaluate, and communicate conclusions and inferences from quantitative information) and QR (Apply effective and efficient mathematical or other formal processes to reason and to solve problems).

Weekly rhythm

I have divided the material for this course into 11 sub-topics. For each of these 11 sub-topics, there will be a video lecture with a set of slides. In general, you will need to watch and review 2 lectures per week. (The exception is the week of the midterm., when you will only review one new lesson). Each week there will also be a reading assignment, a problem set, and a chat discussion on Sakai in which you will be expected to participate.

Problem sets will be due each **Tuesday** night, starting Tuesday 6/6. They will require mastery of the previous week's lectures and reading. Since many of our problem sets will be easiest to complete working things out by hand (rather than on a computer), you will be expected to write out your answers and then scan or photograph them in order to submit via Sakai. ****You are responsible for making sure these scans are legible. I reserve the right to count illegible answers as incorrect.****

I will post the video lectures and slides for the following week's lessons each Wednesday, so you may work ahead a bit if that suits you.

Each Wednesday, I will also post a topic for discussion in the Chat room of our Sakai site. *Every student is required to make at least two separate contributions to that discussion each week, before the next Wednesday rolls around.* Commenting on the discussion needn't take a lot of time. But you will be expected to read what your classmates are saying and add respectfully and thoughtfully to the conversation.

Nota bene:

- Your first problem set will be due by the end of the day (midnight) **Tuesday, June 6.**
- Our first topic for discussion will be posted this **Wednesday, May 31**, and you will be expected to contribute by the end of **Tuesday, June 6.**

Late Policy

Late problem sets will not be accepted, except in rare cases (illness, death, etc).

Readings

I will post all readings for the class on our Sakai site. You do not need to purchase any books.

These readings will come primarily from Gary Hardegree's, *Symbolic Logic: A First Course* (for deductive logic), Ian Hacking's *An Introduction to Probability and Inductive Logic* (for probability), and Daniel Kahneman's *Thinking Fast and Slow* (for heuristics and biases).

Exams

There will be a mid-term and a final for this course. I will expect you to access these exams through Sakai, using the ProctorTrack application. This will require a quick download of the program (if you haven't used it before), and you will also be expected to pay a fee.

Please contact me if you prefer not to use ProctorTrack, and I will discuss alternative arrangements on an individual basis. You can learn about the program here:
<https://www.proctortrack.com/>

Grades

Your grade for the course will be determined as follows:

40% - Homework/Problem sets

20% - Contribution to class discussion (Sakai Chat room)

20% - Mid-term

20% - Final

The following grades are available to earn: A ($\geq 91\%$), B+ ($\geq 88\%$, $< 91\%$), B ($\geq 81\%$, $< 88\%$), C+ ($\geq 78\%$, $< 81\%$), C ($\geq 70\%$, $< 78\%$), D ($\geq 60\%$, $< 70\%$), F ($< 60\%$).

Instructor availability

I will be available to you via e-mail at l.callahan@rutgers.edu. I expect you to reach out whenever you have a question. I am also very happy to set up on campus in-person, Skype, or phone meetings on an individual basis, to discuss anything covered in the lessons you do not understand. In this way, I will shape my "office hours" to fit whatever works for you, within reason.

However, note that *I do not regularly check e-mail between the hours of 8:00pm and 6:00am*. So – if you wait until the night a problem set is due to finish it, and you find you have a question, do not expect that I will be able to answer you.

Tentative schedule

This schedule and pace are subject to change, depending on class interests and the perceived difficulty of various parts of the material.

Week starts	Week	Topic	Lesson	Lecture topic (<i>tentative</i>)	Reading	Homework due
30-May	1	Deduction	1	Arguments and validity	Hardegree 1, 2 (sections 1-3)	
			2	More on arguments and validity		
5-Jun	2	Deduction	3	Connectives and truth tables	Hardegree 2 (sections 4-13), 3	HW1 - June 6
			4	Truth tables and validity		
12-Jun	3	Induction (prob. & decision theory)	5	Introduction to induction	Hacking	HW2 - June 13
			6	Stochastic truth tables		
19-Jun	4	Induction (prob. & decision theory)	7	More on stochastic truth tables	Hacking	No HW - midterm
			*	MIDTERM		
26-Jun	5	Induction (prob. & decision theory)	8	Decision theory	Hacking	HW3 - June 27
			9	Fallacies		
3-Jul	6	Heuristics and biases	10	System 1 & 2	Kahneman	HW4 - July 5 ***Extension to Wed for holiday
			11	Systematic errors		

Academic Integrity

Insofar as possible in an online learning environment, I want you to get to know your classmates and work together to understand the material we will cover. *Collaborating on problem sets* – e.g., convening a group to meet up and work on them together – is permitted and encouraged. However, *copying* the answers to problem sets will be considered a violation of academic integrity. (See below.)

<http://academicintegrity.rutgers.edu/academic-integrity-policy/>

Violations include: cheating, fabrication, plagiarism, denying others access to information or material, and facilitating violations of academic integrity.