

Introduction to Formal Reasoning and Decision Making

Philosophy 109:01&03 (Fall 2018)

Instructor: Dr. Max Bialek

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Lecture: MW 4:30–5:50pm (01) & 2:50–4:10 (03)

Office Hours: TBA

Location: FH-B1

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Course Description. “Fundamentals of logical, probabilistic, and statistical thinking, as well as the basic principles of rational decision making. Reasoning through data (and rhetoric) encountered on a daily basis using elementary principles of deductive logic and inference.”

Resolving differences of opinion isn’t always impossible. Figuring out what you should believe isn’t just a matter of checking what’s true. Deciding what you should do doesn’t have to be left up to your whim. Formal tools have been (and continue to be) developed that enable us to talk very precisely about the strength of arguments and of evidence, the rationality of beliefs we have, and the value of choices we make.

This course will introduce students to some of those formal tools and their applications to formal reasoning and decision making: Formal Logic will be used as a model for expressing ourselves carefully and judging deductive arguments. Probability and Statistics serve as tools for making inductive inferences, evaluating evidence, and quantifying risk and uncertainty. Decision Theory will provide a system that employs those logical and probabilistic tools in order to help guide our decision making. For all of these, we will also discuss their peculiarities, limits to their application, and their potential for expansion and sophistication.

Course Materials. We will be working from a mixture of the course textbook—*Choices: An Introduction to Decision Theory* by Michael Resnik (ISBN: 9780816614400)—and notes provided by the instructor that will be posted to the course website.

Course Website. TBA

Course Requirements & Grading. There will be 10 short assignments, each worth 4% of the course grade, for a total of 40% of the course grade. These will range in style from regular in-class quizzes and short homework assignments, to more unusual fare, like developing a potential exam problem.

Each unit will end with an exam worth 20% of the course grade. A comprehensive final exam will be worth 20% of the course grade. The lowest exam grade will be dropped, for a total of 60% of the course grade coming from exams. This means that if you bomb an exam, you can make up for it with the final, or if you are happy with your grade going into the final, you can skip it.

In short:

40% — 10 Short Assignments at 4% each

60% — 3 Exams at 20% (best of 3 Unit-Specific Exams and 1 Final)

Attendance. Attendance is ungraded, but highly recommended (especially since there will be regular graded in-class work). If you expect to miss any classes, please use the University absence reporting website (<https://sims.rutgers.edu/ssra/>) to indicate the date(s) and reason(s) for your absence.

Accessibility and Accommodations. Any needed accommodations should be brought to the attention of the instructor as soon as possible. Consult with the Rutgers ODS (<https://ods.rutgers.edu>) for help or more information.

Unpleasantries. You should make sure you are familiar with the rules regarding proper academic conduct as detailed at <http://academicintegrity.rutgers.edu>

NOTE: You will be encouraged to work together on many assignments for this course, but material that is handed in must be prepared independently (e.g. don't just change the name at the top of the same paper), and the names of your collaborators should be listed.

Schedule. Below is a tentative schedule for the course. Check the course website at least once a week for assignments, expected reading, and possible changes.

Formal Logic	Sep 5	Truth Tables
	Sep 10 and 12	Boolean Operators
	Sep 17 and 19	Arguments
	Sep 24 and 26	Quantifiers
	Oct 1	Review / Catch-up
	Oct 3	Exam 1
Probability and Statistics	Oct 8 and 10	Probability Theory
	Oct 15 and 17	Chance and Credence
	Oct 22 and 24	Evaluating Evidence
	Oct 29 and 31	Standard Errors
	Nov 5	Review / Catch-up
	Nov 7	Exam 2
Decision Theory	Nov 12 and 14	Decision Problems
	Nov 19	Ignorance
	Nov 26 and 28	Risk
	Dec 3 and 5	Games
	Dec 10	Review / Catch-up
	Dec 12	Exam 3
Final Exam	Dec 20, 4–7pm	Section 01
	Dec 21, 12–3pm	Section 03