Introduction to Formal Reasoning and Decision Making
Philosophy 109
Section H1, Summer 2019

Instructor: Dr. Max Bialek   **Email:** mbialek@rutgers.edu
Lecture: Online   **Office Hours:** by arragnement

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 exclusively from notes provided by the instructor that will be posted to the course website.

Course Website. The course website is done through Canvas, and is available directly at https://rutgers.instructure.com/courses/28717.

Course Requirements & Grading. There will be 11 quizzes, each worth 3% of the course grade. Each quiz may be taken twice, with the higher score being retained. The lowest of the 11 (retained) quiz grades will be dropped, for a total of 30% of the course grade.

Each module will end with an exam worth 20% of the course grade. Each exam will include both oral and online components. The oral component must be completed during a one-on-one video conference with the instructor. It will be pass/fail and worth 25% of the exam grade. Time permitting, a failed oral component may be attempted a second time. Once the oral component is completed, the online component will be unlocked for the individual student.

Two discussion posts (or responses to others' posts) will be required for each of the first five calendar weeks of the course. These will each be worth 1% of the final course grade, for a total 10% of the course grade being based on posts.

In short:

10% — Discussion Posts

30% — 10 Quizzes at 3% each (best of 11)

60% — 3 Exams at 20%

Live Meetings.   The course is entirely online, but there will be regularly scheduled live meetings. These meetings will be recorded so you can still benefit from them if you do not join them. *That said*, you benefit the most from joining them and asking your specific questions and getting live responses from the instructor.

Accessibility and Accommodations.   Any needed accommodations or issues that might affect your academic performance should be brought to the attention of the instructor as soon as possible. Consult with instructor or any of the following offices for help or more information.

- Academic Advising (http://sasundergrad.rutgers.edu/advising/what-is-advising)
- Health and Counseling (http://health.rutgers.edu/medical-counseling-services)
- Office of Disability Services (http://ods.rutgers.edu)

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

NOTE: You may be encouraged to work together on some assignments for this course, but material that is turned 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 *recommended* schedule for the course. The course is primarily self paced, but there are deadlines for completing the three unit exams. **Note that August 14—the Wednesday of our 6th week—is the last day to submit any and all material for the course.**

 Formal Logic

  Week 1 (July 8) Simple Sentences & Complex Sentences

  Week 2 (July 15) Translations & Arguments

  Exam 1 the oral portion must be completed by **July 26** at the latest

 Probability and Statistics

  Week 3 (July 22) Classical Probability & Axiomatic Probability

  Week 4 (July 29) Frequentist Statistics & Bayesianism

  Exam 2 the oral portion must be completed by **August 9** at the latest

 Decisions and Games

  Week 5 (August 5) Representing Decisions & Decision Rules

  Week 6 (August 12) Games (remember that this is a half-week—plan accordingly)

  Exam 3 the oral portion must be completed by **August 14** at the latest