Introduction to Formal Reasoning and Decision Making

Fall 2019

Class Time: Tuesday and Friday 9:50–11:20am

Instructor: Rory Harder

E-mail: rh670@scarletmail.rutgers.edu (see e-mail policy below)

Office Hours: Immediately after class or by appointment

Course Description

This course is an introduction to the formal tools philosophers use to understand reasoning and decision making. The two main forms of reasoning are deductive and inductive. Deductive reasoning involves figuring out what must be true given what one already accepts. We begin the course by studying propositional logic, which provides a simple model of deduction. We then study probability theory as a model of inductive reasoning, which involves figuring out what one should take to be the likelihood of various possibilities. We conclude by looking at expected value theory, which builds on probability theory and is a theory of how one should make decisions under uncertainty.

Course Material

The primary course textbook is Hacking's *An Introduction to Probability and Inductive Logic*. This will be available at the bookstore. All other readings will be made available on the course webpage.

Course Evaluation

1. Homework: 20%. Four problem sets worth 5% each. No group work allowed.
2. Mid-term: 30%. In-class.
3. Final Exam: 40%. During final exam period.
4. Attendance: 10%. You are expected to attend class and participate in discussion and working through exercises in class.

Schedule (Tentative)

Week	Dates	Readings	Topic	Homework
1	September 3		Course Introduction	
	September 6	FaX ch. 1–2	Basic Concepts of Logic I	
2	September 10	FaX chs. 3	Basic Concepts of Logic II	
	September 13	Hardegree ch. 1	Basic Concepts of Logic III	
3	September 17	FaX chs. 4–6	Syntax	HW1 Due
	September 20	Forbes ch. 2	Symbolization I	
4	September 24		Symbolization II	
	September 27	Hardegree Ch. 4	Symbolization III	
5	October 1	FaX chs. 8–9	Semantics I	HW2 Due
	October 4	FaX ch. 10; Hardegree ch. 3	Semantics II	
6	October 8	FaX ch. 11	Semantics III	
	October 11		Semantics IV	
7	October 15	FaX ch. 13	Short Truth-Tables I	
	October 18		Short Truth-Tables II	
8	October 22		Review	
	October 25		Midterm	
9	October 29	Hacking ch. 2	Deduction vs. Induction	
	November 1	Hacking ch. 3	The Gambler's Fallacy	
10	November 5	Hacking ch. 4	Probability: Basic Concepts	
	November 8	Hacking ch. 5	Conditional Probability	
11	November 12	Hacking ch. 6	Probability Theory Axioms	
	November 15	Hacking ch. 7	Probability Theory: Bayes' Rule	HW3 Due
12	November 19		Multiple Conditions	
	November 22		Probability and Induction	
13	November 26	Hacking ch. 8	Decision Making: Basic Concepts	
	November 29		No class—Thanksgiving	
14	December 3	Hacking ch. 9	Decision Making: Utility	
	December 6	Hacking ch. 10	Decision Making: Paradoxes	HW4 Due
15	December 10		Review	

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).

Additional Information

Homework Submission: Homework must be submitted to me in person at the beginning of the class that it is due.

Classroom Etiquette: During class you must not engage in any behaviour that is disruptive to me or your fellow students. This includes speaking or whispering when it is others's turn to speak, and using your phone.

E-mail Policy: I will not answer e-mails that either ask substantive philosophical questions, or ask for information easibly obtainable by checking the syllabus or the course website.

Academic Integrity: You must follow the Rutgers Academic Integrity Policy.

Lateness: Late homeworks will not be accepted, except where there is a legitimate reason for an extension and proof that it is needed (e.g. medical documentation).

Course Webpage: You are expected to check the course webpage on a regular basis to check for updates with regard to assignments and course readings.