PHIL 315/COGS 315 Formal Methods

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General Information

Course Description

This course expands upon the traditional training in logic by introducing students to three paradigms of formal rationality: solitary reasoning, reasoning in action, and group dynamics. We will survey the following methods: propositional logic, dynamic epistemic logic, probability theory, decision theory, classical and evolutionary game theory, voting theory, and network epistemology. Alongside these formal methods, we will also think philosophically about the strengths, limitations, and roles of formal theories of rationality and decision making.

Study material

Logic and the Formal Methods of Philosophy, Gregory Lauro. The textbook is not published. A PDF will be provided to students.

Chapters of *The Stag Hunt and the Evolution of Social Structure* by Brian Skyrms. PDF provided.

Assessment

Midterms (25%x2=50%)

There will be two in-class midterm exams associated with the first two units of the course. Exams are non-cumulative.

Final exam (25%)

There will be an in-person final exam. It is non-cumulative (covers the last unit only) and just like the midterms in terms of the scale.

Short reflective essay (25%)

A short (~4 pages) essay where you compare and contrast the three rationality approaches covered in the class.

Schedule

Week	Topic	Reading
Unit 1: rationality as rule following		
Week 1	Propositional logic	Chapter 1 of textbook
Week 2	Propositional proofs 1	Chapter 2 of textbook
Week 3	Propositional proofs 2	
Week 4	Probability theory	Chapter 8.1-8.5 of textbook
Week 5	Probability and statistics	Chapter 8.7-8.9
Week 6	**Unit 1 exam**	
Unit 2: rationality as pragmatics		
Week 7	Bayesianism and probabilism	Chapter 8.6 of textbook
Week 8	Decision theory	Chapter 9 of textbook

Week	Topic	Reading
Week 9	Game theory	Chapter 10 of textbook
Week 10	**Unit 2 exam**	
	Unit 3: rationality as social dynamics	
Week 11	Evolutionary game theory	Chapter 2 of *The Stag Hunt* by Brian Skyrms
Week 12	Network epistemology	
Week 13	Voting theory	Chapter 11 of textbook

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