Philosophy 12: Scientific Reasoning
Fall 2013

Instructor: Nathan Rockwood
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Course Description:

This course is about the theoretical justification for the practices of science. Topics include the structure of scientific explanation, the structure of observational and experimental studies, and the evaluation of evidence (including from statistics, probability, and game theory). Students will both gain an understanding of the theory of science and have practice implementing the principles they learn.

Course Materials:

i-Clicker, available at the bookstore. (H-ITT or PRS clickers will not work for this class. For more information see http://mediaservices.ucsd.edu/student-response-system)
Philosophy of Science: a very short introduction, Samir Okasha
Statistics: a very short introduction, David J. Hand
Other texts will be provided.

Grading

Clicker Scores:	10%
Online Quizzes:	10%
Homework:	10%
Midterm:	30%
Final Exam:	40%

Schedule

Week 0 (Sept. 27)

- Introduction to the Course — Course Syllabus

Week 1 (Sept. 30, Oct 4, 6)

- Deductive Logic: Conditionals — Handout: Conditionals <WebCT>
- Deductive Logic: Universals — Handout: Universals <WebCT>
- Falsification — *Philosophy of Science*, ch. 1 (p. 1-17)
  Online Quiz 1 (Deductive Logic) <WebCT>

Week 2 (Oct. 7, 9, 11)

- The Problem of Confirmation — Handout: Confirmation
- Scientific Explanation — *Philosophy of Science*, ch. 3 (p. 40-57)
- Enumerative Induction — *Philosophy of Science*, ch. 2 (p. 18-39)
  Homework 1 Due (Logic in Science)

Week 3 (Oct. 14, 16, 18)

- Analogy — *Power of Critical Thinking*, p. 302-308 <WebCT>
- Mill's Method — *Power of Critical Thinking*, p. 311-327 <WebCT>
- Inference to the Best Explanation — *Power of Critical Thinking*, p. 341-378 <WebCT>

Week 4 (Oct. 21, 23, 25)

- Scientific Realism vs. Instrumentalism — *Philosophy of Science*, ch. 4 (p. 58-76)
  Homework 2 Due (Inductive Logic)

• Reductionism	*Philosophy of Science*, pp. 55-57; Handout: Reduction
• **Midterm**	
Week 5 (Oct. 28, 30, Nov. 1)	
• Variables	*Statistics*, ch. 1 (p. 1-20), Handout Variables & Samples
• Summary Statistics	*Statistics*, ch. 2 (p. 21-35)
• Correlation	*Statistics*, ch. 6 (p. 92-109)
	Online Quiz 2 (Statistics) <WebCT>
Week 6 (Nov. 4, 6, 8)	
• Experimental Studies	*Statistics*, ch. 3 (p. 36-54)
• Observational Studies	Handout: Experimental and Observational Studies
• Arguing with Statistics	Newspaper Articles <WebCT>
	Homework 3 Due (Kinds of Studies)
Week 7 (Nov. 11, 13, 15)	
• **No School: Veteran's Day**	
• Confirmation (Neyman-Pearson)	*Statistics*, ch. 5 (p. 75-91)
• Probability	Handout: Probability & Conditional Probability
	<links> (Kahn Academy)
Week 8 (Nov. 18, 20, 22)	
• Conditional Probability 1	<links> (Kahn Academy)
	Online Quiz 3 (Probability)
• Conditional Probability 2	<links> (Kahn Academy)
• Confirmation (Bayesian)	Survey <WebCT>
	Homework 4 Due (Conditional Probability)
Week 9 (Nov. 25, 27, 29)	
• Utility Calculus	Handout: Utility Calculus <WebCT>
• Prisoner's Dilemma & Iterated Games	*Decision Theory*, p. 212-232 <WebCT>
	Online Quiz 4 (Utility Calculus)
• **No School: Thanksgiving**	
Week 10 (Dec. 2, 4, 6)	
• Mixed Strategies & Nash Equilibrium	*Decision Theory*, p. 240-257 <WebCT>
• Game Theory in Biology	
• Game Theory in Social Science	**Homework 5 Due** (Game Theory)
Week 11 (Dec. 11)	
• **Final Exam** 8:00-11:00am	