Philosophy 12: Scientific Reasoning
Fall 2013

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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 orPRS 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)

Week 2 (Oct. 7, 9, 11)
• The Problem of Confirmation  Handout: Confirmation  Philosophy of Science, ch. 3 (p. 40-57)
• Scientific Explanation  Philosophy of Science, ch. 2 (p. 18-39)
• Enumerative Induction  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

• Midterm

Week 5 (Oct. 28, 30, Nov. 1)
• Variables
• Summary Statistics
• Correlation

• Philosophy of Science, pp. 55-57; Handout: Reduction

Week 6 (Nov. 4, 6, 8)
• Experimental Studies
• Observational Studies
• Arguing with Statistics

• Statistics, ch. 1 (p. 1-20), Handout Variables & Samples
• Statistics, ch. 2 (p. 21-35)
• Statistics, ch. 6 (p. 92-109)
• Online Quiz 2 (Statistics) <WebCT>

Week 7 (Nov. 11, 13, 15)
• No School: Veteran’s Day
• Confirmation (Neyman-Pearson)
• Probability

• Statistics, ch. 5 (p. 75-91)
• Handout: Probability & Conditional Probability <links> (Kahn Academy)

Week 8 (Nov. 18, 20, 22)
• Conditional Probability 1
• Conditional Probability 2
• Confirmation (Bayesian)

• <links> (Kahn Academy)
• Online Quiz 3 (Probability)
• Survey <WebCT>

Homework 4 Due (Conditional Probability)

Week 9 (Nov. 25, 27, 29)
• Utility Calculus
• Prisoner’s Dilemma & Iterated Games
• No School: Thanksgiving

• Handout: Utility Calculus <WebCT>
• Decision Theory, p. 212-232 <WebCT>
• Online Quiz 4 (Utility Calculus)

Week 10 (Dec. 2, 4, 6)
• Mixed Strategies & Nash Equilibrium
• Game Theory in Biology
• Game Theory in Social Science

• Decision Theory, p. 240-257 <WebCT>

Homework 5 Due (Game Theory)

Week 11 (Dec. 11)
• Final Exam 8:00-11:00am