Course Objectives:

This course will examine some questions about science that are usually thought of as philosophical in nature (e.g., the nature of scientific inquiry, role of experimentation, what should count as confirming evidence, the nature of a scientific law and of scientific explanation, the structure of scientific theories, etc.). The Copernican Revolution will be studied in some detail to serve as a case study. Other historical examples will be included as appropriate. The course will concentrate on the nature of science as originally developed by logical positivism and on the nature of scientific revolutions.

Texts:

Carl Hempel, Philosophy of Natural Science
Janet Kourany, Scientific Knowledge: Basic Issues in the Philosophy of Science

Course Requirements:

1. Two essay type exams (mid-term and final), each worth 45% of the course grade. The mid-term will be on Monday, Oct. 11, and the final will be Monday, Nov. 15 at 2 p.m.

2. Five or six quizzes based on lecture and assigned readings. Quiz average worth approximately 10 % of the course grade.

3. Five short (2-3 pages) papers on assigned readings in the Kourany text. Each paper should summarize one article from the reading list below. Papers are due as noted on the Reading list below. Papers will be graded satisfactory/unsatisfactory. Failure to submit five satisfactory papers will result in an automatic "F" for the course. Unsatisfactory papers may be revised and resubmitted.

Reading and Topic Sequence:

Hempel, Chapter 1 “Scope And Aim of This Book”
   The Goals of Science

Hempel, Chapter 2, “Scientific Inquiry: Invention and Test”
   Case Study: Semmelweis
   Hypothetical Deductive Model
   Asymmetry of Confirmation and Disconfirmation
Contexts of Discovery vs. Justification
Objectivity in Science

Hempel, Chapter 3, “The Test of a Hypothesis: Its Logic and Force”
   Experimental vs. Non-experimental Sciences
   Duhem’s Thesis
   Crucial Experiments
   Ad Hoc Hypotheses
   Testability-in-Principle
   Verifiability Theory of Meaning

Sir Karl Popper, “Science: Conjectures and Refutations” in Kourany
   (Summary due on Sept. 20)

Case Study: The Copernican Revolution

Hempel, Chapter 5, “Laws and Their Role in Scientific Explanation”
   Scientific Explanation
   Deductive-Nomological Explanations
   Universal Laws vs. Accidental Generalizations
   Probabilistic Explanations
   Probabilistic Laws

Hempel, chapter 6, “Theories and Theoretical Explanation”
   Internal vs. Bridge Principles
   Observable vs. Non-observable Entities
   The “Mountain Top” Conception of Scientific Progress
   Scientific Realism vs. Instrumentalism (Anti-Realism)

Kuhn, The Function of Dogma in Scientific Research” in Kourany
   (Summary due on Sept. 29)
Kuhn, The Nature and Necessity of Scientific Revolutions” in Kourany
   (Summary due on Oct. 8)
Kuhn, “Objectivity, Value Judgment, and Theory Choice” in Kourany
   (Summary due on Oct. 20)
Sir Karl Popper, “Rationality of Scientific Revolutions” in Kourany
   (Summary due on Nov. 1)

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