

Philosophy of science (historical)

Sample syllabus

Fall 2010

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Course description

The philosophy of science asks fundamental questions about the epistemology of scientific discovery and justification. While the discipline often deals with questions that are specific to the special sciences, it is also motivated by problems that are of universal interest to all knowers. Chief among these is the so-called “problem of induction,” the problem of how observations of particulars can help us acquire general knowledge about the unobserved.

Philosophy of science deals with other general epistemological questions, such as those about the nature of causality, explanation, laws of nature, reduction, theoretical entities, and to what extent our observations and our positing of unobservable entities are infused with theoretical assumptions. These questions are of independent interest, but the theme of this course is that these and other problems can be understood better by first understanding the problem of induction, and that the story of the controversy about induction can in many ways tell the story of the development of the philosophy of science.

Though many philosophy of science courses and texts begin the story at the beginning of the century, when the discipline was institutionalized, it is impossible to understand its story without studying the history of the high points of science, and the philosophical thinking undertaken by prominent scientists along the way. For this reason the course will introduce topics through a historical survey beginning with the ancient Greeks, ending in the twentieth century.

Texts

- Timothy McGrew, *Philosophy of Science: An Historical Anthology* (Blackwell, 2009)

Lecture and reading schedule

Ancient views on the role of deduction and induction

Deductivism and Plato

- Euclid
- Plato, from *Phaedo* and *Timaeus*

Socratic induction

- Plato, from *The Republic*

Aristotle on demonstration and induction

- Aristotle, from *Posterior Analytics*
- Aristotle, from *Physics*
- Aristotle, from *History of Animals* and *Parts of Animals*
- Commentary: John McCaskey, “Freeing Aristotelian *Epagoge* from *Prior Analytics* II 23.”

The scientific revolution and early modern scientific thought

The medieval approach to science

- William of Okham, from *Quidlibetal Questions*
- Commentary: Edward Grant, “The reception and impact of Aristotelian learning and the reaction of the Church and its theologians.”

The debate over authority vs. observation

- Cardinal Bellarmine, letters and lectures
- Galileo, from *Dialogues concerning Two New Sciences*

Early controversy over inductive methodology in science

- Francis Bacon, from *Novum Organum*
- Rene Descartes, from *Principles of Philosophy*
- Isaac Newton, from *Principia Mathematica*, “Rules of Reasoning in Philosophy”

Hume’s problem about demonstration

- David Hume, from *Enquiry concerning Human Understanding*
- Thomas Reid, from *Inquiry into the Human Mind and the Principles of Common Sense*

The triumph of nineteenth century science and controversy over induction

The nineteenth century debate over induction in science

- Richard Whately, from *Elements of Logic*
- William Whewell, selections
- John Stuart Mill, from *A System of Logic*

Hypothesis and abductivism

- Charles Darwin, from *Origin of the Species*
- Charles Peirce, “The Nature of Abduction”
- Pierre Duhem, “Against Crucial Experiments”
- Albert Einstein, “On the Method of Theoretical Physics”

Probabilism

- Pierre-Simon Laplace, from *Analytic theory of probabilities*
- John-Maynard Keynes, from *Treatise on Probability*

Twentieth century philosophy of science

Logical positivism

- Rudolf Carnap, “Theory and Observation”
- A.J. Ayer, from *Logic, Truth and Language*

Responses to positivism

- Carl Hempel, “Empiricist Criteria of Cognitive Significance: Problems and Changes,” “The Raven paradox”
- W.V. Quine, from “Two Dogmas of Empiricism,” “Natural Kinds”
- Nelson Goodman, “The New Riddle of Induction”
- Karl Popper, “Conjectures and Refutations”
- Thomas Kuhn, “The Structure of Scientific Revolution”

Realism and anti-realism

- Richard Boyd, “The Current Status of Scientific Realism”
- Larry Laudan, “A Confutation of Convergent Realism”
- Bas van Fraassen, “Constructive Empiricism”