Introduction to the Philosophy of Science
Sample Syllabus

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Course Description

In this course, we examine the core issues in the 20th-century philosophy of science. These issues are: What is science? Does science have a unifying and distinctive feature? What is a scientific explanation? Do scientific explanations in Chemistry and Biology reduce to explanations in fundamental Physics? Are there laws in Biology? What are scientific revolutions? What is scientific progress? Is science objective? How do human values influence science? Does science describe what really exist independent of us? Does science teach us something about human nature? Does our commitment to democracy determine how we should do science?

Course Learning Outcomes

By the end of this course, students should have a broad knowledge of the basic literature and authors in the 20th-century philosophy of science. More specifically, they should be able to identify and analyze the views and arguments present in that literature. Students should also be able to critically examine those views and arguments. They should be able to present these evaluations in written form and engage in constructive discussions.

Course Assessment I (1st or 2nd-year undergraduate course)

5 Discussion questions: Once a week, students provide a written question about one of the readings of the week and a brief justification of why this question is relevant and open to discussion. Precise guidelines will be provided by the instructor in class. – 20%

Midterm and Final Exam: In-class exams will take 90 minutes of class. Each exam consists of 2 essay questions. Versions of the questions will be provided beforehand for study purposes. – 50% total

Report: students have to write a 1000-words report. This report summarizes and compares the views and arguments present in the two readings of a chosen topic. Precise guidelines will be provided by the instructor in class. – 30% total

Course Assessment II (3rd or 4th -year undergraduate course)

11 Discussion questions: Once a week, students provide a written question about one of the readings of the week and a brief justification of why this question is relevant and open to discussion. Precise guidelines will be provided by the instructor in class. – 33%

Paper Outline: Students provide an outline for the final paper and discuss it with the instructor. The outline has to contain the structure of the paper (sections), the main idea of each section, the main thesis of the paper, and basic bibliography – 10%

Draft Feedback: One week prior to the deadline for the final paper, students bring to class a draft version of their papers (an improved outline containing the main arguments of each section). Students gather into groups. Each student has to provide written feedback on the draft of 3 other students. – 20%

Paper: students write a 3000 words paper on one of the topics of the course. The instructor will provide specific guidelines for the paper. Students have to submit a hard copy to the instructor on the due date. – 37%

Topics and Readings

Topic 1 – What is Science? The Demarcation Problem

Popper, Karl (1957). Science: Conjectures and Refutations.

Lakatos, Imre (1998/1977). Science and Pseudo Science.

Laudan, Larry, 1983. "The demise of the demarcation problem", pp. 111–127 in R.S. Cohan and L. Laudan (eds.), *Physics, Philosophy, and Psychoanalysis*, Dordrecht: Reidel.

Pigliucci, Massimo, 2013. "The demarcation problem. A (belated) response to Laudan", in Pigliucci and Boudry (eds.) 2013, pp. 9–28.

Topic 2 – Laws and Scientific Explanations

Hempel, C. and Oppenheim, P. (1948). 'Studies in the Logic of Explanation.', *Philosophy of Science*, 15: 135–175. Reprinted in Hempel, 245–290, 1965a.

Salmon, W. (1989). *Four Decades of Scientific Explanation*, Minneapolis: University of Minnesota Press. Chapter 2

Van Fraassen, B. (1980). The Scientific Image. Oxford. Chapter 5.

Kitcher, P. (1989) 'Explanatory Unification and the Causal Structure of the World', in *Scientific Explanation*, P. Kitcher and W. Salmon, 410–505. Minneapolis: University of Minnesota Press.

Ruse, M. (1970). Are there laws in biology?. *Australasian Journal of Philosophy*, *48*(2), 234-246.

Topic 3 – Reductionism and the Status of the Special Sciences

Oppenheim, P., & Putnam, H. H.(1958). Unity of Science as a Working Hypothesis. *Minnesota Studies in the Philosophy of Science*, *2*.

Fodor, J. A. (1974). Special sciences (or: the disunity of science as a working hypothesis). *Synthese*, *28*(2), 97-115.

Rosenberg, A. (2001). Reductionism in a historical science. *Philosophy of Science*, *68*(2), 135-163.

Sober, E. (1999). The multiple realizability argument against reductionism. *Philosophy of science*, *66*(4), 542-564.

Topic 4 – Scientific Progress, change, and Revolutions

Kuhn, Thomas (1962). The Structure of Scientific Revolutions (4th ed.). Chicago: University of Chicago Press.

Lakatos, I. (1976). Falsification and the methodology of scientific research programmes. In *Can theories be refuted?* (pp. 205-259). Springer, Dordrecht.

Feyerabend, P. (1993). *Against method*. Verso.

Ankeny, R. A., & Leonelli, S. (2016). Repertoires: A post-Kuhnian perspective on scientific change and collaborative research. *Studies in History and Philosophy of Science Part A*, *60*, 18-28.

Topic 5 – Science, Objectivity, Values, and Feminism

Kuhn, T. S. (1977). Objectivity, value judgment, and theory choice. *Arguing About Science*, 74-86.

Longino, H. E. (1988). Science, objectivity, and feminist values.

Douglas, Heather (2007). Rejecting the ideal of value-free science. In Value-Free Science: Ideals and Illusions? Harold Kincaid, John Dupre, and Alison Wylie (eds). Oxford: Oxford University Press

Longino, Helen E. (2004). How values can be good for science. In Science, Values, and Objectivity, Peter Machamer and Gereon Wolters (eds.). Pittsburgh PA, US: University of Pittsburgh Press.

Hicks, D. J. (2014). A new direction for science and values. *Synthese*, *191*(14), 3271-3295.

Topic 6 – Scientific Realism and Anti-Realism

Maxwell, G. (1962). The ontological status of theoretical entities. In Herbert Feigl & Grover Maxwell (eds.), *Scientific Explanation, Space, and Time: Minnesota Studies in the Philosophy of Science*. University of Minnesota Press.

Van Fraassen, B. (1980). The Scientific Image. Oxford. Chapter 2.

Hacking, I. (1983). Representing and Intervening. Cambridge University Press.

Fine, A. (1984). The natural ontological attitude. *The philosophy of science*, 261-277.

Worrall, J. (1989). Structural realism: The best of both worlds?. *Dialectica*, *43*(1-2), 99-124.

Topic 7 – Human Nature

Hull, D. L. (1986). On human nature. In *PSA: Proceedings of the biennial meeting of the philosophy of science association*. Philosophy of Science Association.

Kitcher, P. (1989). Vaulting ambition: Sociobiology and the quest for human nature.

Kronfeldner, M., Roughley, N., & Toepfer, G. (2014). Recent work on human nature: Beyond traditional essences. *Philosophy Compass*, *9*(9), 642-652.

Kronfeldner, M. (2017). *What's Left of Human Nature: A Post-essentialist, Pluralist, and Interactive Account*. MIT

Topic 8 – Science, Democracy, and Politics

Longino, H. E. (2002). Science and the common good: Thoughts on Philip Kitcher's Science, Truth, and Democracy. *Philosophy of Science*, *69*(4), 560-568.

Kitcher, P. (2003). *Science, truth, and democracy*. Oxford University Press.

Brown, M. (2013). Science, Values and Democracy in the Global Climate Change Debate. *Philosophical Pragmatism and International Relations*, 127-51.