

PHIL-UA 90, Spring 2017

PHILOSOPHY OF SCIENCE

Time & Place Room 102, 19 W 4th St, 9.30 to 10.45 AM

Texts *Theory and Reality*, Peter Godfrey-Smith, University of Chicago Press, 2003.

- *The Structure of Scientific Revolutions*, Thomas Kuhn, University of Chicago Press, 1996. (Any edition that contains Kuhn's postscript will work. The pagination is just very slightly different in the latest edition.)
- Readings distributed via NYU Classes

Web Scanned readings will be posted on the course's NYU Classes site, which you access from NYU Home.

Course handouts are posted both at the Classes site and at my personal web page: www.strevens.org/classes/philsci17

Content What is science? How does it work? When it works, what kind of knowledge does it provide? Is there a scientific method? How do experiments provide evidence for theories? What is the nature of scientific explanation? How does the social organization of science contribute, if at all, to its success?

Evaluation Your total grade will be made up of:

First paper (due Mar 6)	20%
Second paper (due Apr 3)	20%
Third paper (due May 8)	20%
Class participation	10%
Take-home exam (due May 10)	30%

Papers should be 1800 to 2000 words long (about six pages with lines one-and-a-half spaced)

The take-home exam will be distributed in the last class (May 8)

Participation means some combination of: turning up for class and recitations; making useful remarks in class and recitations; finding interesting and relevant examples in the science news or elsewhere

Attendance Both classes and recitations are compulsory. This means that in order to pass the class, you must attend all classes and recitations (or provide a valid excuse, for example, a medical certificate). An attendance

register will be circulated in each classes and recitation; it is your responsibility to make sure that you sign it.

Blumberg Kyle Blumberg is our class TA. Office hours are Thu 11:00–12:30 and by appointment.

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Moses Students who require accommodation for a disability should consult with the Henry and Lucy Moses Center for Students with Disabilities at <https://www.nyu.edu/life/safety-health-wellness/students-with-disabilities>

READINGS PHIL SCIENCE

- Jan 23 Introduction
▷ Godfrey-Smith, *Theory and Reality*, chapter 1

Big Theories of Science

- Jan 25 The logical empiricist tradition
▷ Schlick, M., "Positivism and realism", pp. 86–102, 106–107
▷ Maxwell, G., "The ontological status of theoretical entities", pp. 3–11
▷ Godfrey-Smith, *Theory and Reality*, chapter 2 (§2.4 is optional)
- Jan 30 The problems of induction
▷ Strevens, "The problem of induction" (background)
▷ Goodman, N., *Fact, Fiction, and Forecast*, pp. 72–75, 77–83
▷ Godfrey-Smith, *Theory and Reality*, chapter 3 (skip §3.3)
- Feb 1 Popper's falsificationism
▷ Popper, K., *The Logic of Scientific Discovery*, pp. 3–24, 27–29, 57 (intro to chapter 4), 60–67 (starting at "Thus my conflict")
▷ Godfrey-Smith, *Theory and Reality*, chapter 4
- Feb 6 Popper continued
▷ Popper, K., *The Logic of Scientific Discovery*, pp. 264–273, 278–282
- Feb 8 No class
- Feb 13 Kuhn on normal science
▷ Kuhn, *Structure*, chapters 1 through 8
▷ Godfrey-Smith, *Theory and Reality*, chapter 5
- Feb 15 Kuhn on revolutions
▷ Kuhn, *Structure*, chapters 9 through 12 (pp. 96–103 and chap. 10 are optional)
▷ Godfrey-Smith, *Theory and Reality*, chapter 6
- Feb 20 President's Day - no class
- Feb 22 Kuhn on progress
▷ Kuhn, *Structure*, chapters 13 and postscript
- Feb 27 Theory and observation
▷ Hanson, N. R., *Patterns of Discovery*, chapter 1
▷ Fodor, J. A., "Observation reconsidered" (NYU Proxy), introduction, §3 (so omit §§1 & 2)
▷ Godfrey-Smith, *Theory and Reality*, chapter 10, §3
- Mar 1 After Kuhn
▷ Laudan, L., *Progress and Its Problems*, excerpt
▷ Godfrey-Smith, *Theory and Reality*, chapter 7

Laws of Nature and Explanation

- Mar 6 Laws and explanation: Empiricism ◁ Due date
- ▷ Ayer, A. J., "What is a law of nature?", part II
 - ▷ Hempel, C. G. and P. Oppenheim, "Studies in the logic of explanation" (NYU Proxy), pp. 135–146
 - First paper due
- Mar 8 Laws: Realism
- ▷ Dretske, F., "Laws of nature" (NYU Proxy)
- Mar 20 Laws: Pluralism
- ▷ Mitchell, S., "Dimensions of scientific law"
- Mar 22 Explanation: Critique of empiricism
- ▷ Reread Hempel, C. G. and P. Oppenheim, "Studies in the logic of explanation" (NYU Proxy), pp. 135–146
 - ▷ Salmon, W. C., *Four Decades of Scientific Explanation*, pp. 46–50
 - ▷ Godfrey-Smith, *Theory and Reality*, chapter 13 (optional)
- Mar 27 Explanation: The causal approach
- ▷ Strevens, M., "The causal and unification approaches to explanation unified—causally" (NYU Proxy)
- Mar 29 Laws and Explanation: Cartwright
- ▷ Cartwright, N., "Truth doesn't explain much" (NYU Proxy)
 - ▷ Cartwright, N., "Do the laws of physics state the facts?"

Evidence

- Apr 3 Instantialism and the ravens ◁ Due date
- ▷ Hempel, C. G., "Studies in the logic of confirmation" (NYU Proxy), §§1–5
 - ▷ Godfrey-Smith, *Theory and Reality*, chapter 3, §3
 - Second paper due
- Apr 5 Bayesianism: Mechanics I
- ▷ Strevens, M., "Notes on Bayesian confirmation theory", §§1–4
 - ▷ Godfrey-Smith, *Theory and Reality*, chapter 14, §§1–4 (optional)
- Apr 10 Bayesianism: Mechanics II
- ▷ Strevens, M., "Notes on Bayesian confirmation theory", §§5–6
- Apr 12 Bayesianism: Induction
- ▷ Strevens, M., "Notes on Bayesian confirmation theory", §7
- Apr 17 Bayesianism: Subjectivity
- ▷ Strevens, M., "Notes on Bayesian confirmation theory", §9

The Social Aspect of Science

- Apr 19** Science and values
- ▷ Douglas, H., "Inductive risk and values in science"
- Apr 24** Social critique of science
- ▷ Richardson, S. S., "Sexes, species, and genomes: Why males and females are not like humans and chimpanzees"
 - ▷ Okruhlik, K., "Gender bias in the biological and social sciences" (optional)
 - ▷ Godfrey-Smith, *Theory and Reality*, chapter 9
- Apr 26** The sociology of science: Merton
- ▷ Merton, R. K., "The normative structure of science" (optional)
 - ▷ Merton, R. K., "Priorities in scientific discovery" (NYU Proxy), pp. 635–646 (stop before *Humility*), 658–659
 - ▷ Godfrey-Smith, *Theory and Reality*, chapter 8
- May 1** The sociology of science: Constructivism
- ▷ Collins, H. M., "The seven sexes" (NYU Proxy)
- May 3** Organizing science
- ▷ Kitcher, P., "The division of cognitive labor" (NYU Proxy)
 - ▷ Godfrey-Smith, *Theory and Reality*, chapter 11
- May 8** The credit system in science
- ▷ Latour, B. and S. Woolgar, *Laboratory Life*, pp. 200–208
 - ▷ Strevens, M., "The role of the priority rule in science" (NYU Proxy)

◁ Due date

No classes: Wed Feb 8; Mon Feb 20 (President's Day)

Papers are due on Mar 6; Apr 3; May 8

Take-home exam distributed Mon May 8; due Wed May 10

REFERENCES PHIL SCIENCE

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- Cartwright, N. (1980). Truth doesn't explain much. *American Philosophical Quarterly* 17. Reprinted in Cartwright (1983b).
- . (1983a). Do the laws of physics state the facts? In Cartwright (1983b).
- . (1983b). *How the Laws of Physics Lie*. Oxford University Press, Oxford.
- Collins, H. M. (1975). The seven sexes: A study in the sociology of a phenomenon, or the replication of experiments in physics. *Sociology* 9:205–224.
- Douglas, H. (2000). Inductive risk and values in science. *Philosophy of Science* 67:559–579.
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- Fodor, J. A. (1984). Observation reconsidered. *Philosophy of Science* 51:23–43.
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- Goodman, N. (1983). *Fact, Fiction, and Forecast*. Fourth edition. Harvard University Press, Cambridge, MA.
- Hanson, N. R. (1958). *Patterns of Discovery*. Cambridge University Press, Cambridge.
- Hempel, C. G. (1945). Studies in the logic of confirmation. *Mind* 54:1–26, 97–121.
- Hempel, C. G. and P. Oppenheim. (1948). Studies in the logic of explanation. *Philosophy of Science* 15:135–175.
- Kitcher, P. (1990). The division of cognitive labor. *Journal of Philosophy* 87:5–21.
- Kuhn, T. S. (2012). *The Structure of Scientific Revolutions*. Fourth edition. University of Chicago Press, Chicago.

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- Laudan, L. (1977). *Progress and Its Problems*. University of California Press, Berkeley, CA.
- Maxwell, G. (1962). The ontological status of theoretical entities. In H. Feigl and G. Maxwell (eds.), *Scientific Explanation, Space, and Time*, volume 3 of *Minnesota Studies in the Philosophy of Science*, pp. 3–27. University of Minnesota Press, Minneapolis.
- Merton, R. K. (1942). The normative structure of science. *Journal of Legal and Political Sociology* 1:115–126. Originally titled “Science and Technology in a Democratic Order”. Reprinted under the new title in Merton (1973).
- . (1957). Priorities in scientific discovery. *American Sociological Review* 22:635–659.
- . (1973). *The Sociology of Science*. University of Chicago Press, Chicago.
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- Salmon, W. C. (1990). *Four Decades of Scientific Explanation*. University of Minnesota Press, Minneapolis.
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- . (2012). Notes on Bayesian confirmation theory. Book-length lecture notes. Published online at <http://www.strevens.org/bct/>.