PHIL-UA 90, Spring 2025

PHILOSOPHY OF SCIENCE

Time & Place Room LC11, 40 W 4th St (Tisch Hall)
11 to 12.15 PM

Text *Theory and Reality*, Peter Godfrey-Smith, University of Chicago Press, 2021

- Readings distributed via the class Brightspace site

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 10)	30%
Second paper (due Apr 14)	30%
Class participation	10%
Take-home exam (due May 9)	30%

Papers should be 1800 to 2000 words long (about six pages with lines one-and-a-half spaced). You'll write them in Google Docs and then submit a PDF to Brightspace, along with a link to the Google Doc version. We will explain more in due course!

The take-home exam will be distributed in the final class (May 5th)

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

Forster Office hours are Mon 2–3, and Wed 10–11
Room 611, 5 Washington Place
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Strevens Office hours are Wed 1–2:30 and by appointment
Room 603, 5 Washington Place, phone 8-3559
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Weather In the event that weather or other disruptions close the campus, we will meet at our regular time on Zoom using this link: https://nyu.zoom.us/my/strevens

Moses Academic accommodations are available for students with disabilities. The Moses Center website is https://www.nyu.edu/life/global-inclusion-and-diversity/centers-and-communities/accessibility.html. Please contact the Moses Center for Accessibility and Inclusive Culture (212-998-4980 or mosescsd@nyu.edu) for further information. Students who are requesting academic accommodations are advised to reach out to the Moses Center as early as possible in the semester for assistance.

Integrity Academic integrity means that the work you submit is original. Bringing answers into an examination or copying all or part of a paper straight from a book, the Internet, or a fellow student is a violation of this principle, as is using AI such as ChatGPT to generate the text you submit for grading. But there are other forms of cheating or plagiarizing which are just as serious—for example, presenting an oral report drawn without attribution from other sources (oral or written); writing a sentence or paragraph which, despite being in different words, expresses someone else's ideas without a reference to the source of the ideas; or submitting essentially the same paper in two different courses (unless both instructors have given their permission in advance). Receiving or giving help on a take-home paper, examination, or quiz is also cheating, unless expressly permitted by the instructor (as in collaborative projects).

Student Wellness In a large, complex community like NYU, it's vital to reach out to others, particularly those who are isolated or engaged in self-destructive activities. Student wellness (https://www.nyu.edu/students/health-and-wellness.html) is everyone's responsibility. The NYU Wellness Exchange is the constellation of NYU's programs and services designed to address the overall health and mental health needs of its students. Students can access this service 24 hours a day, seven days a week—wellness.exchange@nyu.edu; (212) 443-9999. Students can call the Wellness Exchange hotline (212-443-9999) or the NYU Counseling Service (212-998-4780) to make an appointment for Single Session, Short-term, or Group counseling sessions.

PHIL-UA 90, Spring 2025

READINGS PHILOSOPHY OF SCIENCE

Jan 21 Introduction
- ▷ Godfrey-Smith, *Theory and Reality*, chapter 1 (read at your leisure)

Grand Theories of Science

Jan 27 The logical empiricist tradition
- ▷ Schlick, "Positivism and realism", pp. 86–102, 106–107
- ▷ Maxwell, "The ontological status of theoretical entities", pp. 3–11 (optional)
- ▷ Godfrey-Smith, *Theory and Reality*, chapter 2 (§2.1 to §2.3)

Jan 29 The problems of induction
- ▷ Strevens, "The problem of induction" (background)
- ▷ Goodman, *Fact, Fiction, and Forecast*, pp. 72–75, 77–83
- ▷ Godfrey-Smith, *Theory and Reality*, chapter 3 (skip §3.3, §3.5)

Feb 3 Popper's falsificationism
- ▷ Popper, "Science: Conjectures and refutations"
- ▷ Godfrey-Smith, *Theory and Reality*, chapter 4

Feb 5 Kuhn on normal science
- ▷ Kuhn, *The Structure of Scientific Revolutions*, chapters 1 to 4 (pp. 1–42)
- ▷ Godfrey-Smith, *Theory and Reality*, chapter 5, §5.1 to §5.3

Feb 10 Kuhn on revolutions
- ▷ Kuhn, *The Structure of Scientific Revolutions*, chapters 6, 8, 9 (pp. 52–65, 77–110)
- ▷ Godfrey-Smith, *Theory and Reality*, chapter 5, §5.4 to §5.6

Feb 12 Theory and observation
- ▷ Hanson, *Patterns of Discovery*, chapter 1
- ▷ Fodor, "Observation reconsidered", introduction, §3 (so omit §§1 & 2)
- ▷ Godfrey-Smith, *Theory and Reality*, chapter 9, §9.33

Feb 17 President's Day – no class

Feb 18 After Kuhn
- ▷ Laudan, *Progress and Its Problems*, excerpt
- ▷ Godfrey-Smith, *Theory and Reality*, chapter 6 (except §6.6)

Feb 19 No class

Laws of Nature and Explanation

Feb 24 Laws and explanation: Empiricism
- ▷ Ayer, "What is a law of nature?", part II
- ▷ Hempel and Oppenheim, "Studies in the logic of explanation", pp. 135–146

Feb 26 Laws: Realism
- ▷ Dretske, "Laws of nature"

Mar 3 Laws: Pluralism
- ▷ Mitchell, "Dimensions of scientific law"

Mar 5 Paper writing workshop

Mar 10 Explanation: Critique of empiricism ◁ *Due date*
- ▷ Reread Hempel and Oppenheim, "Studies in the logic of explanation", pp. 135–146
- ▷ Salmon, *Four Decades of Scientific Explanation*, pp. 46–50
- ▷ Godfrey-Smith, *Theory and Reality*, chapter 11, §11.2
- ■ First paper due

Mar 12 Explanation: The causal approach
- ▷ Strevens, "The causal and unification approaches to explanation unified–causally"

Mar 17 Laws and explanation: Cartwright
- ▷ Cartwright, N., "Truth doesn't explain much"
- ▷ Cartwright, *The Dappled World*, pp. 1–6

Mar 19 Explanation, metaphysics, and real life
- ▷ Roberts, "Debating the cause of health disparities: Implications for bioethics and racial equality"

Mar 24 Spring break – no class today or Wednesday

Evidence

Mar 31 Instantialism and the ravens
- ▷ Hempel, "Studies in the logic of confirmation", §§1–5
- ▷ Godfrey-Smith, *Theory and Reality*, chapter 3, §3

Apr 2 To be announced

Apr 7 Bayesianism: Mechanics I
- ▷ Strevens, M., "Notes on Bayesian confirmation theory", §§1–4
- ▷ Godfrey-Smith, *Theory and Reality*, chapter 12, up to §12.5 (optional)

Apr 9 Bayesianism: Mechanics II
- ▷ Strevens, M., "Notes on Bayesian confirmation theory", §§5–6

Apr 14 Bayesianism: Induction ◁ *Due date*
- ▷ Strevens, M., "Notes on Bayesian confirmation theory", §7
- ■ Second paper due

Apr 16 Evidence in scientific writing
- ▷ No reading (watch recorded class)

Apr 21 Bayesianism: Subjectivity
- ▷ Strevens, M., "Notes on Bayesian confirmation theory", §9

Science and the Social

Apr 23 Inductive risk
- ▷ Douglas, "Inductive risk and values in science"
- ▷ Godfrey-Smith, *Theory and Reality*, chapter 8, §8.1, §8.6

Apr 28 Tacit knowledge and social networks
- ▷ Collins, "The TEA set"
- ▷ Godfrey-Smith, *Theory and Reality*, §7.3

Apr 30 The credit system in science
- ▷ Merton, "Priorities in scientific discovery", pp. 635–646 (stop before *Humility*), 658–659
- ▷ Latour and Woolgar, *Laboratory Life*, pp. 200–208
- ▷ Godfrey-Smith, *Theory and Reality*, §7.2, §9.5

May 5 Science and the public
- ▷ Demasi, "On the Mask Study"
- ▷ Bastian, "What a New Review Reveals About the Mask Effectiveness Debate"
- ■ Pick up take-home exam

No classes: February 17th (President's Day), February 19th. But we do meet on Tuesday February 18th (a legislative Monday). Pre-recorded class: April 16th.

Papers are due on March 10th and April 14th

Take-home exam distributed May 5th; due May 9th, 11 AM

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REFERENCES

Ayer, A. J. (1956). What is a law of nature? *Revue Internationale de Philosophie* 36:144–165.

Cartwright, N. (1980). Truth doesn't explain much. *American Philosophical Quarterly* 17. Reprinted in *How the Laws of Physics Lie*. Oxford University Press, Oxford.

———. (1999). *The Dappled World: A Study of the Boundaries of Science*. Cambridge University Press, Cambridge.

Collins, H. M. (1974). The TEA set: Tacit knowledge and scientific networks. *Science Studies* 4:165–185.

Douglas, H. (2000). Inductive risk and values in science. *Philosophy of Science 67:559–579*.

Dretske, F. (1977). Laws of nature. *Philosophy of Science* 44:248–268.

Fodor, J. A. (1984). Observation reconsidered. *Philosophy of Science* 51:23–43.

Godfrey-Smith, P. (2003). *Theory and Reality: An Introduction to the Philosophy of Science*. University of Chicago Press, Chicago.

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.

Kuhn, T. S. (2012). *The Structure of Scientific Revolutions*. Fourth edition. University of Chicago Press, Chicago.

Latour, B. and S. Woolgar. (1986). *Laboratory Life: The Construction of Scientific Facts*. Second edition. Princeton University Press, Princeton, NJ.

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. (1957). Priorities in scientific discovery. *American Sociological Review* 22:635–659.

Mitchell, S. (2002). Dimensions of scientific law. *Philosophy of Science* 67:242–265.

Popper, K. (1963). Science: Conjectures and refutations. In *Conjectures and Refutations: The Growth of Scientific Knowledge*, chap. 1, pp. 33–65. Routledge, London.

Roberts, D. (2012). Debating the cause of health disparities: Implications for bioethics and racial equality. *All Faculty Scholarship* 21:332–341.

Salmon, W. C. (1990). *Four Decades of Scientific Explanation*. University of Minnesota Press, Minneapolis.

Schlick, M. (1932). Positivism and realism. *Erkenntnis* 3:1–31.

Strevens, M. (2004). The causal and unification approaches to explanation unified—causally. *Noûs* 38:154–176.

———. (2012). Notes on Bayesian confirmation theory. Book-length lecture notes. Published online at http://www.strevens.org/bct/.