

Course: Philosophy of Science and Values

Instructor: Brandon Ashby

2. Textbooks and reading materials

Required:

T. Kuhn (1962) *The Structure of Scientific Revolutions*, Chicago: University of Chicago Press. (any edition is acceptable)

All other required reading will be made available as PDFs on the course website.

2. About the course

On a fairly commonsense way of thinking about science, scientific knowledge grows over time. As newer, better theories replace older, less explanatory theories, we learn more and more about objective reality as it is in itself. Somewhere out there are a small number of objective and exceptionless laws of nature, or perhaps even just one, and science will eventually tell us what they are/it is through a long series of “decisive” experiments. Such experiments offer definitive refutations of certain theories, and highlight the way for subsequent development. In this process, the scientist is driven entirely by the data at hand.

Here’s the problem: science doesn’t work that way. Indeed, science *cannot* work that way. Theories are underdetermined by their evidence, experiments are rarely if ever decisive, and experimenters themselves can be stubborn and biased in their evaluation of the evidence. For instance, Nobel laureate and one of the founders of Ethology, Konrad Lorenz, was a member of the Nazi party used his early work on the behavior of wild, domesticated, and hybrid geese to argue that Nazi eugenics policies were justified and that the Holocaust was necessary. So, can we salvage the idea that there is an objective reality that science does, in fact, tell us about? And how are we to understand what science is actually doing to make that possible?

The class will largely consist in two parts. The first part will explore a range of classical issues in the philosophy of science that motivate the questions above. In the second part of the course, we will look at the role of incentive structures in the spread of information through social networks, feminist epistemology of science, as well as formal models of probabilistic reasoning in order to highlight the conditions under which scientific practice and the dissemination of its results to the public can go wrong and conditions under which we can trust scientific results.

As we shall see, science itself takes place within a broader context of incentive and power structures, many of which can embody bad motivations ranging from greed to bigotry. But amidst the complex social tapestry of which scientific practice is a part, there is a message of hope: when certain democratic norms are met, things can get better, science can tend toward truth, and we can slowly work ourselves out from under the biased norms that can influence our thought and behavior. While progress is often slow and halting, and we still have a long way to go, the long arc of history tends towards scientific and moral improvement.

3. Assignments

- Micro-exams, worth 40% of your final grade.

- Essays, worth 50% of your final grade.
- Syllabus quiz, worth 2.5% of your final grade.
- Discussion forum questions, worth 7.5% of your final grade.

3.1 Micro-exams:

You will have a micro-exam every week. Micro-exams can cover any course material (lectures, readings, in-class discussions) presented in the last four weeks of the course. You will have two attempts to take each micro-exam. You will receive the highest score of your two attempts. I drop your two lowest micro-exam scores. Micro-exams will be worth 40% of your final grade. Micro-exams will be administered online via the course website. You will be able to see what questions you got wrong on a micro-exam, but you will not be told the answers to the questions.

3.2 Essays:

You will have three essays over the course of the term. Each will be 2500 words in length. You will have the option of submitting a draft of each paper before you submit it for a final grade. The essays are worth 50% of your final grade and are evenly weighted.

I do not drop any essay scores. However, if you are satisfied with the grade that you receive on your first two essays, then you have the option of applying your combined score on your first two essays to your third essay. In other words, do well-enough on your first two essays and you don't have to do the third. I do this to encourage you to work hard on your first two essays and polish them. You are better off spending time on developing two essays than you are rushing through three.

3.3 Syllabus quiz:

You will have a quiz on the syllabus and the structure of the course at the end of your first week of term. It is worth 2.5% of your final grade.

3.4 Discussion forum questions:

The class will be divided into two groups. You'll get your group number on the first day of class. For every reading, one of the two groups will be required to post or upvote three questions about that reading on the course website. Discussion forum questions will be worth 7.5% of your final grade. Your questions must be uploaded before 11:59PM the day before we discuss that reading in class; I need time to read them before class so I can prepare accordingly. Your questions will be listed anonymously. Only I will be able to see your names attached to the questions. So, do not worry about asking "dumb" questions in front of the other students. In general, if you have a question about the material, there is almost certainly at least one other student with that same question.

4. Course Schedule

Week 1: Scientific Confirmation

- Carl Hempel, (1954) 'Studies in the Logic of Confirmation', *Mind* 54(213): 97-121
- Branden Fitelson & John Hawthorne, (2010) 'How Bayesian Confirmation Theory Handles the Paradox of the Ravens' in E. Eells & J. H. Fetzer (eds.), *The Place of Probability in Science*, Boston Studies in the Philosophy of Science 284, pp. 247-275.

Week 2: What is Science? The Falsification Criterion

- Karl Popper, (1962) Chs. 1 & 11 of *Conjectures and Refutations: The Growth of Scientific Knowledge*, New York, NY: Basic Books.
- Imre Lakatos, (1970) 'Falsification and the Methodology of Scientific Research Programmes', in I. Lakatos & A. Musgrave (eds.), *Criticism and the Growth of Knowledge*, Cambridge: Cambridge University Press.
- Peter Godfrey-Smith, (2003) Ch. 4 of *Theory and Reality: An Introduction to the Philosophy of Science*, Chicago, IL: Chicago University Press.

Week 3: Underdetermination

- Excerpts from Pierre Duhem, (1954) *The Aim and Structure of Physical Theory*, Princeton, NJ: Princeton University Press.
- Excerpts from W.V.O. Quine, (1951) Two Dogmas of Empiricism, *Philosophical Review* 60(1): pp. 20-43.
- W.V.O. Quine, (1975) 'On Empirically Equivalent Systems of The World', *Erkenntnis* 9: pp. 313-328.
- Roger Jones, (1991) 'Realism about What?', *Philosophy of Science*, 58: pp. 185-202.
- Alan Musgrave, (1992) 'Discussion: Realism about What?', *Philosophy of Science* 59: pp. 691-697.

Week 4: Gruesome Theories and Truth

- Nelson Goodman, (1983) Ch. 3 of *Fact, Fiction, and Forecast* (4th ed.), Cambridge, MA: Harvard University Press.
- Frank Jackson, (1975) 'Grue' *Journal of Philosophy*, 72(5): pp. 113-131.
- David Lewis, (1983) 'New Work for a Theory of Universals', *Journal of Philosophy* 61: 343-377.

Week 5: Thomas Kuhn and the Sociology of Science, pt. 1

- Thomas Kuhn, (1996) Chs. I-IX *The Structure of Scientific Revolutions*, 50th anniversary ed., Chicago: University of Chicago Press.
- **Optional draft of first essay is due**

Week 6: Thomas Kuhn and the Sociology of Science, pt. 2

- Thomas Kuhn, (1996) Chs. X-XIII & Postscript, *The Structure of Scientific Revolutions*, 50th anniversary ed., Chicago: University of Chicago Press.
- Donald Davidson, (1973) 'On the Very Idea of a Conceptual Scheme' *Proceedings and Addresses of the American Philosophical Association*, 47: pp. 5-20.
- Hartry Field, 'Theory Change and The Indeterminacy of Reference' *Journal of Philosophy*, 70(14): pp. 462-481.
- **First essay is due**

Week 7: Methodological Anarchism

- Excerpts from Paul Feyerabend, (1993) *Against Method* (4th ed.), London: Verso.
- Rom Har e, (1985) 'For Method: A Response to Feyerabend' *New Ideas in Psychology* 3, pp. 13-17.

- Hilary Putnam, (1981) 'Two Conceptions of Rationality', in his *Reason Truth and History*, Cambridge, Cambridge University Press.
- Paul Feyerabend, (Putnam on Incommensurability', *British Journal for the Philosophy of Science*, 38: pp. 75-81.

Week 8: Constructive Empiricism

- Bas van Fraassen, (1980) Ch. 2 of *The Scientific Image*, Oxford, Clarendon Press.
- Gideon Rosen, (1994) 'What is Constructive Empiricism?', *Philosophical Studies* 74: pp. 143-178
- Bas van Fraassen, (1994) 'Gideon Rosen on Constructive Empiricism', *Philosophical Studies* 74: pp. 179-192

Week 9: Laws of Nature

- David Lewis, (1983) 'New Work for a Theory of Universals', *Journal of Philosophy* 61: 343-377.
- Fred Dretske, (1977) 'Laws of Nature', *Philosophy of Science*, 44: pp. 248-268.
- Nancy Cartwright (1994) 'Fundamentalism vs. the Patchwork of the Laws' *Proceedings of the Aristotelian Society* 94: pp. 279-292.
- Nancy Cartwright, (1997) Models: The Blueprints for Laws', *Philosophy of Science*, 64(4): S292-S303

Week 10: Models

- Michael Weisberg, (2007) 'Who is a Modeler?' *British Journal of Philosophy*, 58(2): 207-233.
- Nancy Cartwright, (1980) The Truth Doesn't Explain Much', *American Philosophical Quarterly*, 17(2): 159-163.
- Daniel Dennett, (1991) 'Real Patterns' *The Journal of Philosophy*, 88(1): 27-51.
- Tyler Millhouse, (2021) 'Really Real Patterns', *Australasian Journal of Philosophy*, early access.
- **Optional draft of second essay is due**

Week 11: Probability

- Excerpts from Richard von Mises
- Karl Popper, (1959) 'A Propensity Interpretation of Probability' *British Journal for the Philosophy of Science*, 10: pp. 25-42.
- David Lewis, (1980) 'A Subjectivist's Guide to Objective Chance', in his *Philosophical Papers*, Vol. 2, Oxford: Oxford University Press.
- **Second essay is due**

Week 12: Information, Networks, and Payoffs

- Brian Skryms, (2010) Chs. 1, 3-9, 13-14 of *Signals: Evolution, Learning, and Information*, New York: Oxford University Press.

Week 13: Values in Science

- Hilary Putnam, (2002) 'The Entanglement of Fact and Value' in his *The Collapse of the Fact/Value Dichotomy and Other Essays*, Cambridge, MA: Harvard University Press. Pp. 28-45.
- Helen Longino, (1990) Ch. 4 of *Science as Social Knowledge: Values and Objectivity in Scientific Enquiry*, Princeton: Princeton University Press.
- Miranda Fricker, (2007) Ch. 1 of *Epistemic Injustice*, New York: Oxford University Press, pp. 9-29

Week 14: Power, Value Judgements, and Testimonial Injustice

- Miranda Fricker, (2007) Chs. 1-2 of *Epistemic Injustice*, New York: Oxford University Press, pp. 30-59
- Dotson, Kristie, (2011) 'Tracking Epistemic Violence, Tracking Practices of Silencing', *Hypatia*, 26(2): 236-257.
- Elizabeth Barnes, (2009) 'Disability and adaptive preference', *Philosophical Perspectives*, 23(1): 1-22

Week 15: The Spread of Misinformation

- Cailin O'Connor & James Owen Weatherall, (2018) Chs. 2-4 of *The Misinformation Age: How False Beliefs Spread*, New Haven, NJ: Princeton University Press.
- Optional draft of final essay is due

Week 16: Finals week

- Final essay is due