

Course Description

This course surveys important developments in twentieth and twenty-first century philosophy of science, including logical empiricism, Popper's falsificationism, Kuhn's model of scientific change, more contemporary approaches and issues, and criticisms of these approaches.

The course addresses such issues as the following: Is there a way to demarcate science from pseudoscience? What is a scientific explanation? To what extent is observation theory-dependent? Is science a rational activity? What does the history of science show about the development of scientific knowledge? How is reasoning in scientific discovery to be analyzed? Is science best thought of as giving us knowledge about the way the world really is? What role do values play in science? And to what extent have women been excluded from or portrayed negatively by science?

Course Texts

This course draws from many seminal books and articles (to be emailed to you the week before each class and also uploaded onto Sakai) as well as from the following **required textbooks**:

- Popper, Karl (1965), *The Logic of Scientific Discovery*. 2nd Edition. New York: Routledge (ISBN: 0415278449)
- Kuhn, Thomas (1970), *The Structure of Scientific Revolutions*. 3rd Edition. Chicago: The University of Chicago Press. (ISBN: 0226458083)

Students may also find it helpful to consult any of the following introductory textbooks to help them grapple with the issues discussed in the course. NOTE: these are **not required reading**.

- o Godfrey-Smith, Peter (2003) *Theory and Reality: An Introduction to the Philosophy of Science* (Science and Its Conceptual Foundations series). Chicago, IL: University of Chicago Press.
- o Okasha, Samir (2002), *Philosophy of Science: A Very Short Introduction*. New York: Oxford University Press.
- o Psillos & M. Curd 2008: *The Routledge Companion to Philosophy of Science*. Routledge.
- o A. Rosenberg 2005: *The Philosophy of Science: A Contemporary Introduction*, 2nd edition. Routledge.

Course Requirements

- Meaningful Participation 5%
 - Students are expected to carefully study all required readings for each week and come prepared to discuss them, raise questions about them, and draw attention to their strengths and weaknesses. Philosophy is a group activity; together we are more than the sum of our parts.

- Presentations on Assigned Readings (sign up by the end of week 3) 15%
 - You will each sign up to present three or four times during the semester. Seminar presentations should be about 20 minutes. You'll need to sign up for topics by September 3, 2014. The presenter's job will be to launch the discussion by offering a concise introduction to the main points of the material. Presenters should read as much as they can, but focus their presentation on the assigned articles or book chapters for the week. The goal is not primarily to give an exegesis, since everyone will be familiar with the reading. Rather, you should *spend no more than 10 minutes reminding us of the primary theses and main arguments of the piece*. The rest of the time should be devoted to discussing issues that you found interesting or puzzling, raising questions, and offering criticisms or emendations.

- Presentation on Seminar Paper Topic 20%
 - The final two classes will be workshops in which each student will make a presentation about his or her work to date on the final essay, giving: a statement of the central question under investigation and some contextualizing background; an indication of what literature there is on the topic and what you intend to focus on; a sketch of how you intend to tackle the subject matter and, if you are this far along, the thesis for which you will argue.

- Seminar Paper (4000 – 5000 words) 60%
 - Your final essays are due to me by December, 17th. Please email them, preferably in MSWord, and I will confirm receipt. The sooner you get started, the better. The topic should relate directly to issues considered in the course. Your papers should be detailed and highly focused. Considering an argument for or against a specific thesis, and/or adjudicating a specific debate between two or three authors in the literature, is far superior to a sweeping or general treatment of a large issue involving many arguments or people.

Seminar Schedule

Week 1 (8/27): Introductions, Syllabus, and a Quick Preview

Week 2 (9/1, 9/3) Logic Plus Empiricism

- Required Reading:
 - o Carnap, R. (1936), "Testability and Meaning," *Philosophy of Science* 3: 419–71.
 - o Ayer, A. J. (1952), *Language, Truth, and Logic*. New York: Dover Publications. (excerpt)
- Recommended Reading:
 - o Creath, R. (2011), "Logical Empiricism," in Edward N. Zalta (Ed.) *The Stanford Encyclopedia of Philosophy*. URL: <http://plato.stanford.edu/entries/logical-empiricism/>

Week 3: (9/8, 9/10) Popper

- Required Reading:
 - o Popper, Chs. 1-5
- Recommended Reading:
 - o Thornton, S. (2009), "Karl Popper," in Edward N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. URL: <http://plato.stanford.edu/entries/popper/>

Week 4: (9/15, 9/17) Influence and Critiques of Popper

- Required Reading:
 - o Lakatos, I. (1970), "Falsification and the Methodology of Scientific Research Programmes," in I. Lakatos and A. Musgrave (Eds.), *Criticism and the Growth of Knowledge*. Cambridge, England: Cambridge University Press, pp. 91-195.
 - o Salmon, W. (1981), "Rational Prediction," *British Journal for the Philosophy of Science* 32: 115-25.

Week 5: (9/22, 9/24) Kuhn

- Required Reading:
 - o Kuhn *Structure*, Entire

Week 6: (9/29, 10/1) Influence of Kuhn and Critiques of Kuhn

- Required Reading:
 - o Masterman, M. (1970), "The Nature of a Paradigm," in I. Lakatos and Alan Musgrave (Eds.), *Criticism and the Growth of Knowledge*. Cambridge, England: Cambridge University Press, pp. 59-89.
 - o Devitt, M. (1979), "Against Incommensurability," *Australasian Journal of Philosophy* 57, 29-50.
- Recommended Reading:
 - o Bird, A. (2004), "Thomas Kuhn," in Edward N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. URL: <http://plato.stanford.edu/entries/thomas-kuhn/>

- Hanson, N. R. (1958), *Patterns of Discovery*. Cambridge: Cambridge University Press.

Week 7: (10/6, 10/8) Explanation I: D-N, Unification

- Required Reading:
 - Hempel, C. (1965), "Studies in the Logic of Explanation," in E. D. Klempey, R. Hollinger, A. D. Kline (Eds.) *Introductory Readings in the Philosophy of Science*, New York: Prometheus Books, pp. 91-108.
 - Kitcher, P. (1989), "Explanatory Unification and the Causal Structure of the World," in Philip Kitcher and Wesley Salmon (Eds.), *Scientific Explanation*. Minnesota Studies in the Philosophy of Science, v. 13. Minneapolis: University of Minnesota Press, pp. 410-505.
- Recommended Reading:
 - Friedman, M. (1974), "Explanation and Scientific Understanding," *The Journal of Philosophy* 71: 5-19.
 - Woodward, J. (2009), "Explanation," in Edward N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. URL: <http://plato.stanford.edu/entries/scientific-explanation/#4.4>

Week 8: (10/13, 10/15) Explanation II: Causal Explanation, Contemporary Mechanistic Views

- Required Reading:
 - Woodward, J. (2003), *Making Things Happen: a Theory of Causal Explanation*. New York: Oxford University Press. (excerpt)
 - Machamer, P., Darden, L. and Craver, C. F. (2000), "Thinking About Mechanisms," *Philosophy of Science* 67: 1-25.
- Recommended Reading:
 - Salmon, W. C. (1989), *Four Decades of Scientific Explanation*. Minneapolis: University of Minnesota Press.

Mid-Semester Break!

Week 9: (10/27, 10/29) Nature of Scientific Laws

- Required Reading:
 - Dretske, F. (1977), "Laws of Nature," *Philosophy of Science* 44: 248-268.
 - Mitchell, S. (1997), "Pragmatic Laws," *Philosophy of Science* 64 (Proceedings): S468-S479.
 - Carroll, J. (2006), "Laws of Nature," in Edward N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. URL: <http://plato.stanford.edu/entries/laws-of-nature/>
- Recommended Reading:
 - Armstrong, D. M. (1983), *What is a Law of Nature?* Cambridge: Cambridge University Press. (excerpt)

Week 10: (11/3, 11/5) Underdetermination

- Required Reading
 - Duhem, P. (1914) [1954], *The Aim and Structure of Physical Theory*, trans. from 2nd ed. by P. W. Wiener; originally published as *La Théorie Physique: Son Objet et sa Structure* (Paris: Marcel Riviera & Cie.), Princeton, NJ: Princeton University Press. (excerpt)
 - Quine, W. V. (1975), “On Empirically Equivalent Systems of the World,” *Erkenntnis* 9: 313–328.
- Recommended Reading:
 - Stanford, K. (2013), “Underdetermination of Scientific Theory,” in Edward N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. URL: <http://plato.stanford.edu/entries/scientific-underdetermination/>

Week 11: (11/10, 11/12) Realism vs. Anti-realism in Science I

- Required Reading:
 - van Fraassen, B. C. (1980), *The Scientific Image*. Oxford: Clarendon Press. (excerpt)
 - Laudan, L. (1981), “A Confutation of Convergent Realism,” *Philosophy of Science* 48: 19-48.
- Recommended Reading:
 - Putnam, H. (1975) *Mathematics, Matter and Method*. Cambridge: Cambridge University Press.
 - Chakravartty, A (2011), “Scientific Realism,” in Edward N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. URL: <http://plato.stanford.edu/entries/scientific-realism/>

Week 12: (11/17, 11/19) Realism vs. Anti-realism in Science II

- Boyd, R. (1983), “On the Current Status of the Issue of Scientific Realism,” *Erkenntnis* 19: 45-90.
- Fine, A. (1984), “Natural Ontological Attitude,” in J. Leplin (Ed.), *Scientific Realism*. University of California Press. 261--77.
- Recommended Reading:
 - Brading, K. and Landry, E. (2006), “Scientific Structuralism: Presentation and Representation,” *Philosophy of Science* 73: 571–581.

Week 13: (11/24, 11/26) Values and Feminism in Philosophy of Science

- Required Reading:
 - McMullin, E. (1988), “Values in Science,” in E. D. Klempey, R. Hollinger, A. D. Kline (Eds.) *Introductory Readings in the Philosophy of Science*. Prometheus Books. New York.
 - Kourany, J. (1992), “Towards a Female-Friendly Philosophy of Science,” *Proceedings of the Biennial Meeting of the Philosophy of Science Association* Volume 2, 320-332.
- Recommended Reading:

- Longino, H. (1990), *Science as Social Knowledge*. Princeton, NJ: Princeton University Press.
- Anderson, E. (2009), "Feminist Epistemology and Philosophy of Science," in Edward N. Zalta (ed.) *The Stanford Encyclopedia of Philosophy*. URL: <http://plato.stanford.edu/entries/feminism-epistemology/>

Week 14: (12/1, 12/3) Seminar Paper Topic Presentations