

Philosophy of Science syllabus

Helen De Cruz
Oxford Brookes University

Semester 2
Wednesday, 9-11 AM

Aims of this module

The purpose of this module is to help students get a better insight into what science is and what roles it plays in our society. It provides a basic introduction to the main philosophical questions concerning scientific knowledge and methodology. It surveys a variety of positions on standard philosophy of science topics, next to some newer directions. With in-class exercises of concrete case studies of scientific practice, students obtain knowledge of the debates in philosophy of science on such topics as scientific realism, feminist philosophy of science, the nature of scientific induction.

Week-by-week overview

Week 1: Natural philosophy and the emergence of science (Bacon, Galileo, Aristotle)

Week 2: The problem of induction (Hume)

Week 3: Are scientists morally responsible for their findings? (Douglas)

Week 4: Can we demarcate science from non-science and pseudoscience (Pennock, Gould)

Week 5: Falsificationism (Popper, Lakatos)

Week 6: Explanation (Hempel, Woodward, Glennan)

Week 7: The structure of scientific revolutions (Kuhn)

Week 8: Feminist philosophy of science (Longino)

Week 9: Scientific realism and its critics (van Fraassen)

Week 10: Scientific laws (Cartwright)

Week 11: Feedback session

Week 12: Module Debriefing

Teaching and assessment

This module is taught via a series of weekly two-hour interactive lectures with ungraded in-class exercises. This allows students to be guided by the module leader and to discuss the themes covered in the lectures with the module leader and their fellow students. Students will write a 2000 word paper, and also have 4 written and 1 oral in-class exercises. These exercises are required to pass the module and will be assessed.

Reading List

All of the below are available in the Harcourt Hill library or online (indicated)

Course Texts: It is recommended, but not required, to read one of these from cover to cover:

Bortolotti, L. (2008). An introduction to the philosophy of science. – a balanced introduction with some attention for the societal dimensions of scientific practice

Ladyman, J. (2002). Understanding philosophy of science. London and New York: Routledge – good intro, a bit heavy on the realism debate

Okasha, S. (2002). Philosophy of science: a very short introduction – if you are pressed for time and still want a fairly comprehensive overview of the field

Rosenberg, A. (2000). Philosophy of science: a contemporary introduction. London and New York: Routledge – tough-going and thorough, recommended if you want a deep and thorough intro to the field

READING BY TOPIC

Week 1: Natural philosophy and the emergence of science

required:

- Galileo Galilei (1632). Dialogue Concerning the Two Chief World Systems - day III (online excerpt) – see also handout and Moodle for text by Aristotle

Week 2: The Problem of induction

required: One of the following versions of Hume

- Hume, Enquiry concerning human understanding - adapted version - section 4, parts 1 and 2, i.e., pp 11-18 (this is Hume “translated” into contemporary English so it reads easier. Recommended if you are not keen on 18th century prose) <http://www.earlymoderntexts.com/assets/pdfs/hume1748.pdf>
- Hume, D. An Enquiry Concerning Human Understanding, chapter 4 (for those wanting to read Hume in his original words) <https://ebooks.adelaide.edu.au/h/hume/david/h92e/chapter4.html>

recommended:

- A Quick Guide to the Replication Crisis In Psychology <https://www.psychologytoday.com/blog/the-nature-nurture-nietzsche-blog/201509/quick-guide-the-replication-crisis-in-psychology>
- Ioannidis, J. (2005). Why most published research findings are false. PLoS Medicine, 3, e124 <http://www.ime.usp.br/~abe/lista/pdfUmmcWDpQz7.pdf>

Week 3: Are scientists morally responsible for their findings?

required:

- Douglas, H. E. (2003). The moral responsibilities of scientists (tensions between autonomy and responsibility). *American Philosophical Quarterly*, 59-68.

recommended:

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

Week 4: Demarcation

required:

- testimony by Robert Pennock for the Kitzmiller vs Dover case (2005). Will be handed out in class and available on Moodle

recommended:

- Gould, S.J. Non-overlapping magisterial
http://www.stephenjaygould.org/library/gould_noma.html
- Forrest, B. (2000). Methodological Naturalism and Philosophical Naturalism. *Philo*, 3, 7-29.

Week 5 Falsificationism

required:

- Popper, K. (1972). Conjectures and refutations: the growth of scientific knowledge - only read sections I-III of chapter 1, "Science: conjectures and refutations"

recommended:

- Ketelaar, T., & Ellis, B. J. (2000). Are evolutionary explanations unfalsifiable? Evolutionary psychology and the Lakatosian philosophy of science. *Psychological Inquiry*, 11, 1–21.

Week 6: Explanation

required:

- Woodward, J. (2002) What is a mechanism? A counterfactual account. *Philosophy of Science*, 69, S366-377

recommended:

- Glennan, S. (1996). Rethinking mechanistic explanation. *Philosophy of science*, 69, S342–S353.
- Cleland, C.E. (2011). Prediction and explanation in historical natural science. *British Journal for the Philosophy of Science*, 62, 551-582.

Week 7: The structure of scientific revolutions

required:

- Kuhn, T. (1996) *The structure of scientific revolutions*. Chicago: University of Chicago Press (you will find the relevant passages to read on Moodle)

recommended:

- Feyerabend, P. (1993). *Against method*. London: Verso.
- Barash, D. *Paradigms lost*

Week 8

required:

- Longino, H. E. (1991). Multiplying subjects and the diffusion of power. *Journal of Philosophy*, 88, 666-674

recommended:

- Kitcher, P. (1990). The division of cognitive labor. *The Journal of Philosophy*, 5-22.
- Longino, H. E. (1990). *Science as social knowledge: Values and objectivity in scientific inquiry*. Princeton University Press.
- Bright, L.K. (manuscript, see Moodle to download) Du Bois' Democratic Defence of the Value Free Ideal. unpublished – please do not circulate or place online without the permission of the author

Week 9

required:

- van Fraassen, B. (1980). *The scientific image*. Oxford University Press, only chapter 2

recommended:

- Laudan, L. (1981). A confutation of convergent realism. *Philosophy of science*, 19-49.
- Ladyman, J. (2011). Structural realism versus standard scientific realism: the case of phlogiston and dephlogisticated air. *Synthese*, 180(2), 87-101.

Week 10

required:

- Cartwright, N. (1994). Fundamentalism vs. the Patchwork of Laws. *Proceedings of the Aristotelian Society*, 94, 279-292.

recommended:

- Dupre, J. (2001). Human nature and the limits of science. Oxford: Clarendon Press.
- Mitchell, S. D. (2000). Dimensions of scientific law. *Philosophy of Science*, 242-265.

Assessment

This module will be assessed by 100% coursework consisting of:

1 x 2000 word essay chosen from one of the following three topics (see reading list for readings associated with each essay):

- People have an increasing distrust of science. How can we address this problem?
- Is evolutionary psychology a progressive research program? (or is it just-so story telling)?
- Are scientists responsible for their findings?

5 x 500-word in-class exercises about the following topics:

- Natural philosophy and science: Point out the differences between Aristotle and Galileo in their writings about the nature of the universe (handout provided in class)
- Moral responsibility of scientists: explain what went wrong in the case of Andrew Wakefield and children's vaccinations (handout provided in class)
- The nature of explanation: Explain how counterfactual explanation works in the article by Seyfarth et al (provided in class)
- Demarcation: discussion and writing exercise on Pennock's testimony for the Kitzmiller versus Dover case (2005)
- Mini-presentations on the social dimension of science, comparing Helen Longino, WEB Du Bois and Philip Kitcher's approach to the cognitive division of labour. How can we ensure good scientific practice?