HPSC 2003 Topics in Philosophy of Science
2011: Term 2

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Office Hours 11:00 - 13:00 Wednesdays (or by appointment)

This course is a continuation of HPSC1003 Philosophy of Science, intended for students that have completed that course or studied a similar introduction to philosophy of science elsewhere. Four major topics will be explored in depth: realism and antirealism about scientific theories and natural kinds, scientific explanation; causation and laws of nature. After this course you should possess a fairly well-rounded view of the field, as well as a set of skills that will allow you to work further on your own. Please check your e-mail regularly for information about this course.

Lectures: **(TERM 2)** *Tuesdays* 16:00 – 18:00 in room G3, 22 Gordon Square.
Office hours: *Wednesday* 11.00 – 1.00 in room 4.2, 22 Gordon Square.

Assessment is by a written examination (60%) in term 3, and one long essay (3,000 words, contributing 40% of the final mark) in term 2. Please consult the departmental Notes for Guidance on departmental rules regarding essay assignments. **Please note that you must submit both the essay and sit the exam in order to complete this course unit.** For assessment you will need to master the content of the lectures, all required readings, and any other specified further readings for the essay. **Attendance at lectures is mandatory and will be monitored.**

Essay

1. The essay is due on **4th March** at 23:59. The essay must be submitted on moodle.
2. It is essential that you submit your essay on time. If, however, you do not, penalties apply for late submissions as outlined in the STS student handbook.
3. All final versions of the essay must be word processed.
4. Please feel free to discuss your essay topic with me. I will suggest some essay topics in class. The essay *must* explore topics in greater depth than in class lectures. Essays should not be based solely on class notes and *required reading* materials. You should also focus on *further readings* and also feel free to use material not on the reading lists. The essay *must* include footnotes and a bibliography.
5. Please note that the essay should NOT provide an overview or a summary of the topic. Try to be focussed in answering the essay question, and to articulate your answer by considering the main thesis, possible objections to it and possible replies to those objections. The aim of a philosophy essay is to help you develop critical and argumentative skills by:

    1. giving an accurate description of the main philosophical thesis,
    2. being able to give a fair and not-question-begging criticism of it in the light of the literature, and
    3. being able to identify the strengths and weaknesses of the view in question and possible ways of defending it (even if you personally may think that it is untenable).

Reading materials: The textbook for this course, in which you can find most of the required readings and many of the further readings, is Martin Curd and J. A. Cover (eds.) (1998) *Philosophy of science: the central issues* (New York and London: W.W. Norton & Company). This is an anthology of classic readings, with helpful introductions, notes and commentary by the editors. It is available for purchase at Waterstone's, and some copies are also in the UCL Libraries. I will post as many readings as possible on moodle. Further readings not included in the above textbook or on moodle are available in the UCL Science Library and/or Main Library.

SOURCES FOR BACKGROUND AND GENERAL REFERENCE

Introductory textbooks

A. F. Chalmers (1982) *What is this thing called science?* (Milton Keynes: The Open University Press), ch. 1-8.

Carl. G. Hempel (1966) *Philosophy of Natural Science* (Englewood Cliffs: Prentice-Hall).

Alexander Bird (1998) *Philosophy of science* (McGill Queen's University Press).

James Ladyman (2002) *Understanding Philosophy of Science* (New York: Routledge)

Alan Musgrave (1993) *Common sense, science and scepticism: a historical introduction to the theory of knowledge* (Cambridge:Cambridge University Press).

Samir, Okasha (2002*) Philosophy of Science: A very short Introduction,* Oxford: Oxford University Press Y. Balashov and Alex Rosenberg (2002) *Philosophy of science: contemporary readings* (New York: Routledge).

More advanced texts with general relevance to this course

Statis Psillos (1999) *Scientific realism: how science tracks truth* (New York: Routledge).

Ian Hacking (1983) *Representing and Intervening* (Cambridge: Cambridge University Press).

Nancy Cartwright (1983) *How the laws of physics lie* (Oxford: Clarendon Press).

Peter Lipton (1991) *Inference to the best explanation* (New York: Routledge)

Wesley Salmon (1989) *Four decades of scientific explanation* (Minneapolis: University of Minnesota Press).

Bas van Fraassen (1980) *The scientific image* (Oxford: Clarendon Press).

Anthologies

R. Boyd, P. Gasper, and J. D. Trout (eds.) (1991) *The Philosophy of Science* (Cambridge, Mass.: MIT Press).

P. M. Churchland and C. A. Hooker (eds.) (1985) *Images of science* (Chicago: University of Chicago Press).

J. Leplin (ed.) (1984) *Scientific Realism* (Berkeley: University of California Press).

D. Papineau (ed.) (1996) *The Philosophy of Science* (Oxford: Oxford University Press).

F. Weinert (1995) *Laws of nature. Essays on the philosophical, historical and scientific dimension* (De Gruyter: Berlin).

J. W. Carroll (ed.) (2004) *Readings on laws of nature* (Pittsburgh: University of Pittsburgh Press).

David Papineau (ed.) (1996), *The Philosophy of Science: Oxford Readings in Philosophy,* Oxford: Oxford University Press.

References

The Oxford Companion to Philosophy ed. By Ted Honderich (Oxford: Oxford University Press, 1995)
Routledge Encyclopedia of Philosophy ed. By Edward Craig (London: Routledge, 1998).
Stanford Encyclopaedia of Philosophy
A Companion to the Philosophy of Science ed. by W. H. Newton-Smith (Blackwell Publishing).

SYLLABUS AND LECTURE PLAN

Unit 1: Introduction: Challenges to Scientific Rationality (11 Jan 2011)

Required Readings

Kuhn, T. (1982), "Commensurability, Comparability, Communicability", *Proceedings of the Biennial Meeting of the Philosophy of Science Association Vol. II* : 669-688. [On Moodle]

Quine, W.V.O. (1951),"Two Dogmas of Empiricism", *Phil Review*, 6(1) : 20-43. [On Moodle]

Further Reading

Feyerabend, P. (1975), *Against Method* New York: Verso.

Kincaid, H. (1996), *Philosophical Foundations of the Social Sciences*, Cambridge, Cambridge University Press, Chapter 2.

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

Lakatos, I. (1970), "History of Science and its Rational Reconstructions", *PSA Proceedings of the Biennial Meeting of the Philosophy of Science*: 91-136. (Available on Jstor)

Rorty, R. (1979), *Philosophy and the Mirror of Nature*, Princeton: Princeton University Press.

Unit 2: Scientific realism: The "no miracle" argument and the pessimistic meta-induction (18 January)

Required Readings

Hilary Putnam (1978) "What is realism?" in *Meaning and the Moral Sciences* (London: Routledge). [On Moodle]

Larry Laudan "A confutation of convergent realism", in Curd and Cover, pp. 1114-1135. [On Moodle]

Further readings

Boyd, Richard. (2002) 'Scientific Realism', *Stanford Encyclopedia of Philosophy*. [On Moodle]

Cartwright, Nancy, (1983) *How the Laws of Physics Lie*, Oxford: Oxford University Press, Essays 2–4, 6 and 8.

Chalmers, Alan. (1978) *What is this thing called Science?*, Berkshire: Open University Press, Chapter 15.

Ladyman, James. (2002) *Understanding Philosophy of Science*, London: Routledge. Chapters 5 and 6.

Laudan L. and Leplin J. (1991) 'Empirical Equivalence and Underdetermination' *Journal of Philosophy* LXXXVIII(9): 449–72. [On Moodle]

Philip Kitcher (1993) *The Advancement of Science* (Oxford: Oxford University Press), ch. 5 pp. 127-149.
Maxwell, G. (1962): "The ontological status of theoretical entities", in H. Feigl and G. Maxwell (Eds.), *Minnesota Studies in the Philosophy of Science* Volume III (University of Minnesota Press: Minneapolis): 3-27. [On Moodle]
Psillos, Stathis. (1996) 'Scientific Realism and the Pessimistic Induction', *Philosophy of Science* 63, Proceedings of the 1996 Biennial Meetings of the Philosophy of Science Association. Pt. I: Contributed Papers: S306–S314. [On Moodle]
Worrall, J. (1994) 'How to remain (reasonably) optimistic: scientific realism and the 'luminiferous ether'', *Proceedings of the Philosophy of Science Association Biennial Meeting*, Contributed Papers (1994), vol.5(1), pp. 334-42. [On Moodle]

Unit 3: What is anti-realism? Bas van Fraassen's constructive empiricism (25 Jan 2011)

Required readings

Bas van Fraassen "Arguments concerning scientific realism" in Curd and Cover, pp. 1064-1087.
Alan, Musgrave. "The Ultimate Argument for Scientific Realism", Robert Nola (ed.), *Relativism and Realism in Science*, 229-252., KIuwer. [On Moodle]

Further readings

Gabriele Contessa (2006). "Constructive Empiricism, Observability, and Three Kinds of Ontological Commitment". *Studies in History and Philosophy of Science* 37 (4): 454–468. [On Moodle]
Hasok Chang (2005). "A Case for Old-Fashioned Observability, and a Reconstructed Constructive Empiricism". *Philosophy of Science* 72 (5): 876-887. [On Moodle]
James Ladyman (2004). "Constructive Empiricism and Modal Metaphysics: A Reply to Monton and Van Fraassen". *British Journal for the Philosophy of Science* 55 (4): 755-765. [On Moodle]
Peter Lipton (2004, 2nd ed.) *Inference to the best explanation* (London: Routledge), ch. 4.
Peter Lipton & Paul Dicken. (Forthcoming) "What Can Bas Believe?"Musgrave and Van Fraassen on Observability", *Analysis*. [On Moodle]
Grover Maxwell "The ontological status of theoretical entities" in Curd and Cover, pp. 1052-1063. [On Moodle]
Bradley Monton and Chad Mohler, (2008), "Constructive Empiricism", *Stanford Encyclopedia of Philosophy*. [On Moodle]
Bradley Monton & Bas C. van Fraassen (2003). " *British Journal for the Philosophy of Science* 54 (3):405- 422. [On Moodle]
Alan Musgrave "Realism versus constructive empiricism", in Curd and Cover pp. 1088-1111.
Van Fraassen, Bas Van. (1976) 'To Save the Phenomena', *Journal of Philosophy*, 73. No. 18: 623–32. (Reprinted in Boyd et al (eds.) [On Moodle]
Van Fraassen, Bas Van (1980), *The Scientific Image*, London, Clarendon Press.

Unit 4: Between realism and antirealism: Ian Hacking's experimental realism (1st February 2011)

Required readings

Ian Hacking "Experimentation and scientific realism" in Curd and Cover, pp.1153-1168.

David Resnik "Hacking's experimental realism" in Curd and Cover pp. 1169-1185.

Further readings

Hacking, I. (1983) *Representing and Intervening* (Cambridge: Cambridge University Press), ch.10.

Hacking, I. (1989) "Extragalatic reality: the case of gravitational lensing", *Philosophy of Science* **56** pp. 555-81. [On Moodle]

Shapere, Dudley (1982), "The concept of observation in science and philosophy", *Philosophy of science* 49: 485-525. [On Moodle]

Massimi, M. (2004), "Non-defensible middle ground for experimental realism: why we are justified to believe in colored quarks", *Philosophy of Science* **71**, 36–60. [On Moodle]

Unit 5: Realism, Anti-realism and Natural Kinds (8th February 2011)

Required readings

Richard Boyd (1991). "Realism, Anti-Foundationalism and the Enthusiasm for Natural Kinds". *Philosophical Studies* 61 (1-2):127-48. [On Moodle]

Putnam, H., 1975, "The Meaning of 'Meaning", *Minnesota Studies in the Philosophy of Science* 7: 215–271. [On Moodle]

Further readings

Bird. & E. Tobin (2008) "Natural Kinds", *Stanford Encyclopedia of Philosophy* [On Moodle]

Dupré, J., 1981, "Natural Kinds and Biological Taxa", *Philosophical Review* 90(1): 66 – 90. [On Moodle]

Ellis, B. and Lierse, C., 1994, "Dispositional Essentialism", *Australasian Journal of Philosophy* 72: 27–45. [On Moodle]

Kripke, S., 1971, "Identity and Necessity" *Identity and Individuation*, M.K. Munitz, (ed.), New York, New York University Press, 135–64. [On Moodle]

Kripke, S., 1972, "Naming and Necessity". *Semantics of Natural Language*, G. Harman & D. Davidson (eds.), Dordrecht: Reidel, 253–355. [On Moodle]

Kripke, S., 1980, *Naming and Necessity*. Oxford: Basil Blackwell.

LaPorte, J., 1996, "Chemical Kind Term Reference and the Discovery of Essence", *Noûs*, 30: 112–132. [On Moodle]

Mellor, D. H., 1977, "Natural Kinds", *British Journal for the Philosophy of Science* 28: 299–331. [On Moodle]

Mumford, S., 2005, "Kinds, Essences, Powers", *Ratio* 18: 420–436. [On Moodle]

Putnam, H., 1973, "Meaning and Reference", *Journal of Philosophy* 70: 699–711. [On Moodle]

Salmon, N., 1979, "How *Not* to Derive Essentialism from the Theory of Reference", *Journal of Philosophy* 76: 703–725. [On Moodle]

READING WEEK (14 – 18 February): NO LECTURES

Unit 6: The deductive-nomological model of scientific explanation (22nd February 2010)

Required readings

Carl G. Hempel "Two basic types of scientific explanation" in Curd and Cover , pp. 685-94.

Carl G. Hempel & Paul Oppenheim (1948). "Studies in the Logic of Explanation". *Philosophy of Science*, 15 (2): 135-175. [On Moodle]

Further readings

Carl G. Hempel "Inductive-statistical explanation" in Curd and Cover pp. 706-16.

Peter Railton "A deductive-nomological model of probabilistic explanation", in Curd and Cover pp. 746-764.

W. Salmon "Four decades of scientific explanation", reprinted in P. Kitcher and W. Salmon (eds.) *Scientific explanation*, *Minnesota Studies in the Philosophy of Science* Vol. XIII, see especially Sections 0, 1, and 2, pp. 3–60 [Short Loan Collection].

S. Psillos, (2002), *Causation and Explanation*, Chesham, Acumen. (In particular, part III)

Unit 7: Alternative models of scientific explanation: causation, unification, and pragmatics (1st March)

Required readings

W. Salmon (1992) "Scientific explanation" in Salmon, Earman (eds.) *Introduction to the Philosophy of Science* (Indianapolis: Hackett Publishing Company), pp. 7–41. [Will be made available in student common room before lecture]

P. Kitcher (1981) "Explanatory unification", *Philosophy of science* 48, pp. 507-31. [On Moodle]

Further readings

P Dowe, (1995), "Causality and Conserved Quantities: A Reply to Salmon", *Philosophy of Science*, 62, pp. 321-333. [On Moodle]

P. Dowe, (1992), "Wesley Salmon's Process Theory of Causality and the Conserved Quantity Theory", *Philosophy of Science*, 59, pp. 195-216. [On Moodle]

M. Friedman (1974) "Explanation and scientific understanding", *Journal of Philosophy* 71, 1-19. [On Moodle]

P. Kitcher and W. Salmon (eds.) (1989), *Scientific explanation*, Minnesota Studies in the Philosophy of Science Vol. XIII.

P. Kitcher (1989) "Explanatory unification and the causal structure of the world" in P. Kitcher and W. Salmon (eds.) *Scientific Explanation*, Minnesota Studies in the Philosophy of Science Vol. XIII, pp. 410–505 [Short Loan Collection].

Van Fraassen (1980) *The Scientific Image*, ch. 5.

P. Humphreys (1989) "Scientific explanation: the causes, some of the causes, and nothing but the causes", in P. Kitcher and W. Salmon (eds.) *Scientific explanation*, Minnesota Studies in the Philosophy of Science Vol. XIII, pp. 283–306 [Short Loan Collection].

S. Psillos. (2002), *Causation & Explanation*, Acumen, 215- 293, Ch. 3.

Wesley C. Salmon (1989), *Four Decades of Scientific Explanation*, University of Pittsburgh Press.

Wesley C. Salmon (1998). *Causality and Explanation*. Oxford University Press.

Wesley C. Salmon "Causation and Explanation: A reply to two critics", *Philosophy of Science* 64 (3): 461-477. [On Moodle]
Van Fraassen "The pragmatics of explanation" in Boyd, Gasper and Trout (eds.) *Philosophy of Science*, pp. 317–328. [On Moodle]
Woodward, J. (2003), "Scientific Explanation", *Stanford Encyclopedia of Philosophy* Online. [On Moodle]

Unit 8: Interlude: David Hume and the problem of causation (8th Mar)
Required readings
D. Hume (1739/40) *A Treatise of Human Nature* Book I, Part III, sections I-VI, and XIV [7 copies available in the Main Library]

Further readings
G. Strawson (1987) "Realism and causation" *Philosophical Quarterly* **37**, pp. 253-77. [On Moodle]
S. Psillos, (2002), "Causation", Causation & Explanation, Acumen. (Ch. 1)
C. J. Ducasse (1966) 'Critique of Hume's Conception of Causality', *Journal of Philosophy* **63**, p. 141-48 [On Moodle]
J. A. Robinson (1962) 'Hume's two definitions of "cause"', *Philosophical Quarterly* **12,** pp. 162-71 [On Moodle]
T. Beauchamp and A. Rosenberg (1976) *Hume and the Problem of Causation* (Oxford University Press), ch. 1.

Unit 9: Laws of nature. The Regularity Theory (15 March)
Required readings
J. W. Carroll "Laws of nature", *Stanford Encyclopedia of Philosophy*. [On Moodle]
David Lewis (1973), *Counterfactuals* pp. 72-77. [Short Loan Collection] (will be also available in student common room before the lecture)

Further readings
A.J. Ayer "*What is a law of nature?*", in Curd and Cover, pp. 808–825
D. M. Armstrong (1983) *What is a law of nature?* (Cambridge: Cambridge University Press), ch. 1, 2, 5 (see also other interesting chapters 3 and 4 in the same book). [Short Loan Collection]
David Lewis (1994) "Humean supervenience debugged", *Mind* 103, pp. 478–9 only.
S, Psillos. (2002), *Causation & Explanation*, Acumen, 137-211, Ch. 2.

Unit 10: Laws of nature. The Necessitarian Theory (22 March)
Required readings
Fred Dretske "Laws of nature" in Curd and Cover pp. 826-845. [On Moodle]
J. Bigelow, B. Ellis, C. Lierse "The world as one of a kind" in John W. Carroll *Readings on laws of nature* ch. 8. [On Moodle]

Further readings
D. M. Armstrong (1983) *What is a law of nature?* (Cambridge: Cambridge University Press), pp. 77-92 and 99-107 only [Short Loan Collection].
A. Bird. (2005), "The Dispositionalist Conception of Laws" *Foundations of Science* 10 : 353-70. [On Moodle]

Van Fraassen “Armstrong on laws and probabilities” in John W. Carroll (ed.) *Readings on laws of nature* (University of Pittsburgh Press), ch. 6.
Bas van Fraassen (1989) *Laws and symmetry*, (Oxford: Clarendon), pp. 94-109. [Short Loan Collection in Main Library]
M. Tooley “Laws of nature” in John W. Carroll *Readings on laws of nature* ch. 2. [Short Loan Collection]
S, Psillos. (2002), *Causation & Explanation*, Acumen, 137-211, Ch. 2.