

HPSC2003 – Philosophy of Science 2

Course Syllabus

2012-13 session | Dr. Chiara Ambrosio | c.ambrosio@ucl.ac.uk

Course Information

This course is a continuation of HPSC 1003 Philosophy of Science, intended for students that have completed that course or studied a similar introduction to philosophy of science elsewhere. The course explores some recent debates in general philosophy of science, including: realism and antirealism about scientific theories, scientific explanation, laws of nature, reductionism and the unity of science. 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.

Basic course information

| | |
|------------------|--|
| Course website: | |
| Moodle Web site: | search 'HPSC2003' |
| Assessment: | One long essay (3000 words, worth 50% of the final mark), and a final examination (worth 50% of the final mark) |
| Timetable: | [insert this link www.ucl.ac.uk/sts/hpsc Do not enter any other info here] |
| Prerequisites: | Students must have taken HPSC 1003 (or equivalent), or must have tutor's approval. |
| Required texts: | No required texts. Please refer to course syllabus or Moodle site. |
| Course tutor: | Chiara Ambrosio |
| Contact: | c.ambrosio@ucl.ac.uk t: 020 7679 0166 |
| Web: | www.ucl.ac.uk/sts/staff/ambrosio |
| Office location: | 22 Gordon Square, Room 1.2 |
| Office hours: | Thursdays 11-1 |

Schedule

Week 1 (2 October) – Introduction

Ronald Giere, "Viewing Science", Proceedings of the Biennial Meeting of the PSA Association, 1994, vol. 2, pp. 3-16.

Part 1 – Realism and Anti-Realism

Week 2 (9 October) – What is Scientific Realism?

Required Readings:

- Hilary Putnam (1978) "What is realism?" in *Meaning and the Moral Sciences* (London: Routledge), only up to p. 184.
- Larry Laudan "A confutation of convergent realism", in Curd and Cover, pp. 1114-1135.

Further Readings:

Kuhn, T. S. (1982) 'Commensurability, comparability, communicability', *Proceedings of the Philosophy of Science Association Biennial Meeting*, 1982, vol. 2 Invited papers and symposia [download from JSTOR *Philosophy of science* — see also related articles in the same symposium]. Reprinted in Kuhn (2000) *The road since structure* (Chicago: University of Chicago Press), pp. 33-57.

Philip Kitcher (1993) *The Advancement of Science* (Oxford: Oxford University Press), ch. 5 pp. 127-149 only

Bain, J. and Norton, J. D. (2001) 'What should philosophers of science learn from the history of the electron?', in J. Z. Buchwald and A. Warwick (eds.) *Histories of the electron. The birth of microphysics* (Cambridge, MA: MIT Press).

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.

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

Week 3 (16 October) Constructive Empiricism

Required readings:

- Bas van Fraassen "Arguments concerning scientific realism" in Curd and Cover, pp. 1064-1087.
- Alan Musgrave "Realism versus constructive empiricism", in Curd and Cover pp. 1088-1111.

Further readings:

Grover Maxwell “The ontological status of theoretical entities” in Curd and Cover, pp. 1052-1063.

Peter Lipton (2004, 2nd ed.) *Inference to the best explanation* (London: Routledge), ch. 4.

Paul Churchland (1985) ‘The Ontological Status of Observables: in praise of the Superempirical Virtues’, in P. M. Churchland and C. A. Hooker (eds.) *Images of science* (Chicago: University of Chicago Press), pp. 35-47.

Van Fraassen, Bas (1985) ‘Empiricism in the Philosophy of Science’, in P. M. Churchland and C. A. Hooker (eds.) *Images of science* (Chicago: University of Chicago Press), pp. 245-368.

Week 4 (23 October) – “If You can Spray Them, They are Real”: Ian Hacking’s Experimental Realism

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) “Extragalactic reality: the case of gravitational lensing” *Philosophy of Science* **56** pp. 555-81.

Shapere, Dudley (1982), “The concept of observation in science and philosophy” ,*Philosophy of science* **49**: 485-525.

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.

Ian Hacking “Do we see through a microscope?” in P. Churchland and C. A. Hooker, *Images of science*, pp. 132-52, with a reply from Bas van Fraassen pp. 297-300.

Week 5 (30 October) – Beyond Realism and Anti-Realism?

Required Readings:

- Hasok Chang (2012), “Active Realism and the Reality of H₂O”, in: *Is Water H₂O?*

Evidence, Realism and Pluralism. Dordrecht: Springer, pp. 201-251.

Further Readings:

Hasok Chang (2012), *Is Water H₂O? Evidence, Realism and Pluralism*. Dordrecht: Springer.

Hasok Chang (2005), "A Case for Old Fashioned Observability, and a Reconstructed Constrictive Empiricism", *Philosophy of Science*, vol. 72, no. 5, pp. 876-887.

Hasok Chang (2001), How to Take Realism Beyond Foot-Stamping , *Philosophy*, 2001, Vol.76(1), pp.5-30

Stathis Psillos, "A Philosophical Study of the Transition from the Caloric Theory of Heat to Thermodynamics: Resisting the Pessimistic Meta-induction", *Studies in the History and Philosophy of Science*, 25 (1994): 159-190.

Hasok Chang "Preservative Realism and its Discontents: Revisiting Caloric", *Philosophy of Science*, 70 (2003), pp. 902-912.

Reading Week (5 November) – No Lectures

Part 2: Explanation, Laws and the (Dis)Unity of Science

Week 6 (13 November) – The Deductive-Nomological Model of Explanation

Required readings:

- Rudolf Carnap, "The Value of Laws: Explanation and Prediction", in Martin Curd and J. A. Cover, *Philosophy of Science: The Central Issues* (New York and London: Norton, 1998), pp. 678-684.
- Carl G. Hempel "Two basic types of scientific explanation" in Curd and Cover , pp. 685-94.

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].

Stathis Psillos (2002), *Causation and Explanation*. Chesham: Acumen Publishing

Week 7 (20 November) – Alternative Models of Scientific Explanation: Causation, Unification, Pragmatics

Required Readings:

- W. Salmon (1992) “Scientific explanation” in Salmon, Earman (eds.) *Introduction to the Philosophy of Science* (Indianapolis: Hackett Publishing Company), pp. 7–41.
- P. Kitcher (1981) “Explanatory unification”, *Philosophy of science* 48, pp. 507–31.
- Van Fraassen “The pragmatics of explanation” in Boyd, Gasper and Trout (eds.) *Philosophy of science*, pp. 317–328.

Further readings

M. Friedman (1974) “Explanation and scientific understanding”, *Journal of Philosophy* 71, 1–19.

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].

Wesley C. Salmon “Causation and Explanation: A reply to two critics”, *Philosophy of Science* 64 (3): 461–477.

Week 8 (27 November) – Laws of Nature

Required Readings:

- Stathis Psillos (2002), “The Regularity View of Laws”, and “Laws as Relations Among Universals” (Chapters 6 and 7), in: *Causation and Explanation*. Chesham: Acumen Publishing, pp. 137–177.

Further Readings:

J. W. Carroll “Laws of nature”, Stanford Encyclopedia of Philosophy (see especially sections 1,2, 3, and 8).

Nelson Goodman (1983), *Fact, Fiction and Forecast* (Cambridge, Mass.: Harvard University Press).

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. [Short Loan Collection]

Bas van Fraassen (1989) *Laws and symmetry*, (Oxford: Clarendon), ch, 3 [Short Loan Collection in Main Library]

Fred Dretske “Laws of nature” in Curd and Cover pp. 826-845.

Week 9 (4 December) – The (Dis)Unity of Science

Required Readings:

- Richard Creath (1996) “The Unity of Science: Carnap, Neurath and Beyond”, in P. Galison and D. Stump, *The Disunity of Science* (Stanford: Stanford University Press), pp. 158-169.
- John Dupré (1996) “Metaphysical Disorder and Scientific Disunity” in P. Galison and D. Stump, *The Disunity of Science* (Stanford: Stanford University Press), pp. 101-117.

Further readings:

John Dupré (1993) *The Disorder of Things*. Cambridge, Mass.: Harvard University Press.

Peter Galison and David J. Stump (1996), *The Disunity of Science* (Stanford: Stanford University Press).

Alan Richardson and Thomas Uebel..” *The Cambridge Companion to Logical Empiricism*. Cambridge University Press, 2007. Cambridge: Cambridge University Press (Available electronically at Cambridge Collections Online).

Week 10 (11 December) – From Disunity to Pluralism

Required Readings:

- Hasok Chang (2012), “Pluralism in Science: A Call to Action” in: *Is Water H₂O? Evidence, Realism and Pluralism*. Dordrecht: Springer, pp. 253-301

Further Readings:

Paul Feyerabend (1975). *Against method* . London: New Left Books.

Paul Feyerabend (1999) *The conquest of abundance: A tale of abstraction vs. the richness of being* . Chicago: University of Chicago Press.

John Dupré (1993) *The Disorder of Things*. Cambridge, Mass.: Harvard University Press.

Peter Galison and David J. Stump, *The Disunity of Science: Boundaries, Contexts, and Power* (Stanford: Stanford University Press, 1996).

S. Kellert, H. Longino and K. Waters (eds.) (2006), *Scientific Pluralism* (Minneapolis: University of Minnesota Press).

Hasok Chang (2009) "We Have Never Been Whiggish (About Phlogiston)" , *Centaurus*, vol. 51, pp. 239-264.

Hasok Chang (2012), *Is Water H₂O? Evidence, Realism and Pluralism*. Dordrecht: Springer.

Assessments

Summary

| | Description | Deadline | Word limit |
|------------|-------------|--------------------------------|------------|
| Coursework | Essay 1 | 11.59 pm Friday 14 December | 3000 |
| Exam | Exam | Term 3 Date TBC | NA |

Assessment is by a written examination (50%) in term 3, and one long essay (3,000 words, contributing 50% of the final mark) in term 1.

You must submit both the essay and sit the exam in order to complete this course unit.

The essay is due on Friday 14 December at 23:59. The essay must be submitted both on Moodle (using Turn-it-In) and as a hard copy, which can be left in my pigeon hole. The date of Moodle submission will count as the official submission date.

You can submit a 500 - 700 words plan for your essay, on which I will give you feedback. This is entirely optional, and will not be assessed. **Note that the deadline for essay plans is Monday 26**

November. You can send your essay plan to my e-mail address.

It is essential that you submit your essay on time. If you do not, or you are not granted a formal extension, penalties apply for late submissions as outlined in the STS Student Handbook.

All final versions of the essay must be word processed. Penalties for over-length coursework apply as described in the STS Student Handbook.

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.

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 to 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).

Criteria for assessment

The departmental marking guidelines for individual items of assessment can be found in the STS Student Handbook.

Aims & objectives

The course explores some recent debates in general philosophy of science, including: realism and antirealism about scientific theories, scientific explanation, laws of nature, reductionism and the unity of science. After this course, students should possess a fairly well-rounded view of the field, as well as a set of skills that will allow them to work further on their own.

General Reading List

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 several copies are also in the UCL Libraries. Any reading not included in the above textbook is available in the UCL Science Library and/or Main Library, if not available online in Moodle.

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).
Peter Godfrey-Smith (2003) *Theory and Reality* (Chicago: The University of Chicago Press).

More advanced texts with general relevance to this course

- Statis Psillos (1999) *Scientific realism: how science tracks truth* (New York: Routledge).
Stathis Psillos (2002) *Causation and Explanation* (Chesham: Acumen).
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).
John Dupré (1993) *The Disorder of Things*. Cambridge, Mass.: Harvard University Press.
Peter Galison and David J. Stump (1996), *The Disunity of Science: Boundaries, Contexts, and Power* (Stanford: Stanford University Press).
Hasok Chang (2012), *Is Water H₂O? Evidence, Realism and Pluralism*. Dordrecht: Springer.

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).

Course expectations

Students are expected to attend the lectures and tutorials, complete the assignments by the due dates and do the assigned readings in preparation for the weekly tutorials.

Important policy information

Below are listed some important points of policy. Further details of all these policies can be found in the STS Student Handbook www.ucl.ac.uk/sts/handbook

Late submission of coursework

Penalties for late coursework submission are as follows:

- loss of 5 marks for work submitted less than 24 hours late
- loss of 15 marks for work submitted between 1 and 7 days late
- loss of all marks (i.e. work is graded 0) if submitted more than 7 days late

These rules are statutory and non-negotiable.

Coursework word limits

Penalties for over-length coursework are as follows:

- Assessed work should not be more than 10% longer than the prescribed word count. Assessed work with a stated word count above this maximum cannot be accepted for submission, but will be immediately returned to the student with instructions to reduce the word length. The work may then be resubmitted, except insofar as penalties for late submission may apply.
- If submitted work is subsequently found to have an inaccurately stated word count, and to exceed the upper word limit by at least 10% and by less than 20%, the mark will be reduced by ten percentage marks, subject to a minimum mark of a minimum pass assuming that the work merited a pass.
- For work which exceeds the upper word limit by 20% or more, a mark of zero will be recorded.
- Footnotes and endnotes **do** count as part of the word limit
- Bibliography, tables, pictures and graphs **do not** count as part of the word limit.

Extensions

If unforeseeable circumstances prevent the completion of a piece of coursework, students may request an extension to the set deadline. Please consult the STS Student Handbook for further guidance on acceptable grounds for requesting an extension. Extensions must be negotiated in advance with the course tutor. Students to whom STS is parent department may also request an extension from their Personal Tutor. No extension is considered official without written approval.

The request for extension form can be found at: www.ucl.ac.uk/sts/study

Plagiarism

The *UCL Student Handbook* defines plagiarism as “the presentation of another person’s thoughts or words or artefacts or software as though they were [your] own”. Students are expected to know the College and Department policies in detail and to avoid even the appearance of inappropriate behaviour. In the first demonstrated instance of plagiarism or other irregularities in this course, students normally will receive a 0 F for the course and will be referred to the department and College officials for further action. All course work is subject to scrutiny against past papers and other materials for irregularities. Electronic and other checks will be conducted; see the *STS student handbook* for additional information.

Attendance

Regular attendance is mandatory.

Requirements to complete modules

Students are required to be ‘complete’ in all modules. Normally all assignments must be attempted in order for students to be considered complete. This is different from ‘passing’ a module which requires a minimum overall module mark of 40%.

Assessment and additional examiners

Assessed materials are marked by the course tutors. These provisional marks will be distributed to students at the first opportunity. To ensure fairness, materials subsequently are scrutinised by a second examiner within the Department, and a consensus is reached on these separate assessments. All assessed materials and the consensus marks are made available for scrutiny by an examiner external to UCL. Marks are considered final only after the Board of Examiners for Science and Technology Studies has approved them in their annual meeting near the close of Term three.

Disputed marks

Students must endeavour to discuss any grievances over marks informally with the course tutor in the first instance. If informal discussion fails to resolve the matter satisfactorily and there appears to be genuine and substantive grounds for appeal, the student should submit a written explanation of their grievance to the chair of the board of examiners. A final formal written appeal can be made to the College Registrar.

Mechanisms for student feedback

Students have a variety of means for commenting on the module and module tutor. These include written module evaluations at the end of term, regular lecture assessments offered by the module tutor, and in-session opportunities. Students are welcome to bring comments and criticisms to the module tutor in the first instance, by anonymous note if necessary, then to their personal tutor or the STS undergraduate tutor. The department schedules regular meetings of the Undergraduate Student Staff Consultative Committee to which all students are invited.
