CONTEMPORARY PHILOSOPHY OF SCIENCE

SCIENTIFIC EXPLANATION

PHIL 6730
Fall 2010
Wed. 11:30 – 2:20
Philosophy Seminar room

Instructor: Andrew Wayne
Office: MACK 331
Office hours: Tuesday 1:30 – 3:30
and by appointment
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Course Outline
Knowing *why* is a singular achievement, distinct from other scientific accomplishments. Science aims at describing and representing nature, predicting and controlling it; but science also aims at explanation. This course focuses on philosophical work on scientific explanation and related issues, with an emphasis on contemporary work. The first part of the course surveys standard approaches to scientific explanation due to Hempel, Kitcher, Salmon, Woodward and others. The second part introduces some significant challenges to these approaches raised by instrumentalism, anti-reductionism, and idealization in the context of physics (Duhem, van Fraassen, Batterman). The third part investigates new approaches to scientific explanation that aim to meet these challenges.

Texts and Course Materials
- Coursepack of selected readings, TBA.
- It is recommended that you purchase some or all of the following books: van Frassen 1980, Hempel 1965, Salmon 1984, Woodward 2003, Batterman 2002.
- Online materials at http://courselink.uoguelph.ca. You are responsible for accessing CourseLink regularly. Some course materials and grading comments may only be available on CourseLink.

Course Requirements
15% One synthesis paper, 5-7 pages
20% Presentation
25% Take-home midterm test, questions handed out Oct. 20, due Oct. 27.
40% Term paper, due Dec. 8.

The synthesis paper is to focus on the readings for one week and is due before or at the beginning of class that week. No late synthesis papers will be accepted. No late midterm tests will be accepted. Late term papers will be accepted without penalty only in very unusual circumstances and only if cleared with the instructor in advance. Late papers not authorized in advance will be penalized one grade for each day late (for example, after one day a B becomes a B-).

Electronic devices
In order to create a positive learning environment for all participants, this class is conducted in “airplane mode,” which means that certain electronic devices are permitted on board, but with restricted use. Phones and other wireless handheld devices may not be used and must be turned off. Laptop computers may be used solely for purposes directly related to the course, and they must have all send/receive functions (wifi, bluetooth and network connectivity) disabled.

Additional support
Students with special needs or requiring additional support are encouraged to speak with me as early in the term as possible to ensure that appropriate arrangements are made.

Tentative schedule

Date	Topic	Required reading	Presenter
Sep. 15	Introduction	Weinberg 2001	None
1. Philosophical accounts of scientific explanation			
Sep. 22	Deductive-nomological models	Hempel 1965, pp. 245-251, 333-354, 412-415	
Sep. 29	Unificationist models	Kitcher 1981; Kitcher 1985	
Oct. 7	Causal models	Salmon 1984, chs. 1 and 5	
Oct. 13	Manipulationist models	Woodward 2003, chs. 1, 5 and 8	
Oct. 20	Explanation and understanding	Trout 2007; de Regt 2009	
	Take-home midterm test questions handed out		
2. Challenges from physics			
Oct. 27	Non-Galilean idealization	Wayne 2010	None
	Take-home midterm test due		
Nov. 3	Instrumentalism	Duhem 1908/1969, chs. 7 and Conclusion; van Fraassen 1980, ch. 5.	
Nov. 10	Anti-reductionism	Batterman 2002, chs. 2 and 3	
3. New approaches			
Nov. 17	Proposed solutions	Batterman 2002, ch. 4; Bokulich 2010	
Nov. 24	A better solution	Wayne, TBA	None
Dec. 1	Conclusion	TBA	None
	Term paper due Dec. 8		

E-mail Communication

As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the university and its students.

When You Cannot Meet a Course Requirement...

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. See the undergraduate calendar for information on regulations and procedures for Academic Consideration: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml

Drop Date

The last date to drop one-semester Fall 2010 courses, without academic penalty, is **Thursday November 4**. For regulations and procedures for Dropping Courses, see the Undergraduate Calendar: http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml

Copies of out-of-class assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and enjoins all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded in any electronic media without the permission of the presenter, whether the instructor, a classmate or guest lecturer.

Resources

The Undergraduate Calendar is the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate programs. It can be found at:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/

References

Batterman, R. W. (2002). The Devil in the Details: Asymptotic Reasoning in Explanation, Reduction, and Emergence. Oxford; New York, Oxford University Press.

Bokulich, A. (2010). "How Scientific Models Can Explain." Synthese **Forthcoming**.

de Regt, H. W. (2009). "The Epistemic Value of Understanding." Philosophy of Science **76**: 585-597.

Duhem, P. M. M. (1908/1969). To Save the Phenomena : An Essay on the Idea of Physical Theory from Plato to Galileo. Chicago, University of Chicago Press.

Hempel, C. G. (1965). Aspects of Scientific Explanation, and Other Essays in the Philosophy of Science. New York, Free Press.

Kitcher, P. (1981). "Explanatory Unification." Philosophy of Science **48**: 507-531.

Kitcher, P. (1985). "Two Approaches to Explanation." Journal of Philosophy **82**: 632-639.

Salmon, W. C. (1984). Scientific Explanation and the Causal Structure of the World. Princeton, N.J., Princeton University Press.

Trout, J. D. (2007). "The Psychology of Scientific Explanation." Philosophy Compass **2**(3): 564-591.

van Fraassen, B. C. (1980). The Scientific Image. Oxford, Clarendon press.

Wayne, A. (2010). "Expanding the Scope of Explanatory Idealization." Philosophy of Science **Forthcoming**.

Weinberg, S. (2001). "Can Science Explain Everything? Anything?" New York Review of Books **May 2001**.

Woodward, J. (2003). Making Things Happen : A Theory of Causal Explanation. Oxford, Oxford University Press.