6AANA026 Philosophy of Science
Syllabus – Academic year 2015/16

Basic information

Credits: 20
Module Tutor: Sherrilyn Roush
Office: 610 Philosophy Building
Consultation time: Tuesday 11-12:00, Wednesday 15-16:00
Semester: 2
Lecture time and venue: Tuesday 9-10:00, K 2.40
Seminar time and venue: Tuesday 10-11:00, Strand 306

Module Description

This course in general philosophy of science will address questions like: What is required for observations to support scientific hypotheses? What makes something a scientific explanation? Is a computer simulation as good as an experiment? Is the predictive success of science a reason to believe its theories are true about unobservables? Can science be distinguished from metaphysics? Can biology be reduced to physics? Topics covered include the problem of induction, falsificationism, the problem of auxiliary hypotheses, the advantages and disadvantages of Bayesianism, empiricism, the role of natural law and causes, the pessimistic induction. The scientific examples and probability that we use will be taught in class.

Objectives

-- Textually-referenced knowledge of some of the main problems of general philosophy of science
-- Ability to deploy some philosophical techniques and argumentative strategies that can be used to discuss those problems
-- Transferable skills of formulating and evaluating arguments both for and against various other kinds of philosophical positions
-- Understanding of the place of some of these issues within general philosophy

Assessment

Formative assessment: 2 x 1,500 word essays
Formative essays due: 5pm 26 February 2016
5pm 1 April 2016
Any essays received past the deadline without prior permission or an extremely good excuse will not be given feedback.
Summative assessment: 1 two-hour exam in May or June
Outline of Lecture Topics and Suggested Readings

**Week 1 - Logical Positivism – Science is all surface. Metaphysics is meaningless.**


**Week 2 – Induction and Confirmation: from observations to predictions, and back**


**Week 3 – Induction and Confirmation: the role of probability**


**Week 4 – Scientific Explanation: Deductive-Nomological and Statistical Relevance views**


**Week 5 – Scientific Explanation: Unification and Causal/Mechanical views**


**READING WEEK**
Week 6 – Reduction and Emergence: Is biology “nothing but” physics?
The Structure of Science, E. Nagel, 1961, Routledge, Ch. 11

Week 7 – Simulation and Experiment: Just as good?
“The Epistemic Superiority of Experiment to Simulation,” Roush ms.

Week 8 – Rationality, Theory, and Observation: How do we choose theories?
The Structure of Scientific Revolutions, Thomas Kuhn AND

Week 9 - Realism vs. Anti-realism: Are our theories true?
“A Cubicle World as a Model of Inference to Unobservable Things”, Hans Reichenbach, Experience and Prediction, 1938, 105-134 AND
The Scientific Image, Bas van Fraassen, Chs. 1-2.
OR

Week 10 – Realism and Anti-realism: Should past failure worry us?

Further Reading

Week 1:

Week 2
Causality and Explanation, Wesley Salmon, Ch.1.

Week 3
Probability

Novel Prediction


Simplicity

‘Bayes and Bust: Simplicity as a Problem …,’ §§ 1, 2, 3, 6, Forster The British Journal for the Philosophy of Science 46 (Sep., 1995), 399-424.


Week 4


The Structure of Science, E. Nagel, Ch. 4, Routledge, 1961.


Week 5


Week 7

Week 8

Week 9

Introductory Textbooks
Peter Godfrey-Smith (2003), Theory and Reality: An Introduction to the Philosophy of Science, University of Chicago Press. – Excellent contemporary introduction. A relatively cheap paperback, so worth considering if you plan to buy any books for the course.
M. H. Salmon et al (1992), Introduction to the Philosophy of Science Prentice-Hall.
W. Newton-Smith (1981), The Rationality of Science, Routledge

Classic Texts
W.V. Quine (1990), The Pursuit of Truth, Harvard University Press.
K. Popper (1959), The Logic of Scientific Discovery, Hutchinson Press
A.J. Ayer (1946), Language Truth and Logic, Dover

Collections
J. Leplin (1984), Scientific Realism, University of California Press.
D. Papineau (1996), The Philosophy of Science, OUP.
A. Richardson and T. Uebel (2007), The Cambridge Companion to Logical Empiricism, CUP.
Sample Essay Questions

1. What can the four main views of explanation say about the following purported explanation?

   God wants it to be the case that A.
   What God wants to be the case is the case.
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   Therefore, A

2. Why does Hume think his skeptical conclusion – that we are not rationally justified in believing the future will resemble the past – poses no threat to common life?

3. Is Popper successful in arguing that we can make sense of all the epistemic things scientists do without appealing to induction?

4. The legitimacy of drawing conclusions from simulations is always relative to the knowledge we have. But isn't this also true of experiments? So what is the difference?

5. Many realists think that the only or best explanation of the predictive success of science is the approximate truth of its theories. What are some other possible explanations?

6. Why does the picture of the history of science as successive paradigm shifts threaten to make theory choice look irrational? Is there any way to avoid this implication?

7. If we had a complete atomic description of the world, would we still need the science of biology to explain living organisms?