6AANA026 Philosophy of Science  
Syllabus – Academic year 2016/17

Basic information

Credits: 20  
Module Tutor: Sherrilyn Roush  
Office: 610 Philosophy Building  
Consultation time: Wednesday 12-1, Friday 1-2  
Semester: 2  
Lecture time and venue: Wednesday 9-10:00, K 2.40  
Seminar time and venue: various

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 essay questions are on page 4 of this file

Formative assessment: 2 x 1,500 word essays  
Formative essays due: 4pm 24 February 2017  
4pm 31 March 2017

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 – *indented are optional*

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

Week 8 – Simulation and Experiment: Just as good?
“The Epistemic Superiority of Experiment to Simulation,” Roush ms.

Week 9 – Rationality, Theory, and Observation: How do we choose theories?
The Structure of Scientific Revolutions, Thomas Kuhn AND

Week 10 - Realism vs. Anti-realism: Are our theories true?
The Scientific Image, Bas van Fraassen, Chs. 1-2.

Week 11 – Realism and Anti-realism: Should past failure worry us?
Formative Essay Questions 1:

1. Explain the verifiability criterion of meaning. How is it supposed to avoid both realism and idealism?

2. Explain the problem of induction, and explain what you think is the best response to it and why.

3. What is the problem of auxiliary hypotheses? Is the problem different for inductivists and deductivists?

4. Explain and critically evaluate the falsificationist’s view of theory choice in science.

5. Explain and evaluate one argument that it is rational to follow the axioms of probability.

6. Evaluate the advantages and disadvantages of a theory of explanation that requires reference to laws (and not to causation).

7. Should a theory of explanation require reference to causes (or causal processes)?

8. Explain how Kitcher’s view of explanation as unification makes good sense of cases that had seemed to be counterexamples to Hempel’s law-based view.

Formative Essay Questions 2:

1. Should we accept the unity of science as a working hypothesis? If so, why? If not, why not? (Explain what you mean by “unity of science”.)

2. What is multiple realizability, and does it threaten the reductionist program?

3. Explain how the methods of experiment and simulation both depend on background knowledge. Does that mean that they are equally powerful epistemic methods?

4. Kuhn writes: “There is no such thing as research in the absence of any paradigm.” Why does he think this? What are the implications for theory testing, and are they acceptable?

5. Explain epistemic scientific realism. Construct a defense of it via an inference to the best explanation, and critically evaluate that argument.

6. Explain the pessimistic induction over the history of science and one counterargument, and critically evaluate both.
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**


**Weeks 10-11**


**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.


**Classic Texts**


**Collections**


D. Papineau (1996), *The Philosophy of Science*, OUP.
