6AANA026 Philosophy of Science
Syllabus – Academic year 2014/5

Basic information

**Credits:** 15
**Module Tutor:** Eleanor Knox
**Office:** PB 413 (Go past the departmental office, and down the stairs at the end of the corridor. My office is on the ground floor.)
**Consultation time:** 10:00-11:00 Tuesdays, 11:00-12:00 Wednesdays
**Semester:** 1
**Lecture time and venue**: Tuesdays 2-3pm, S-2.23 (Except in week 5 – 12-1pm Monday 20\(^{th}\) Oct, S-2.23)

*Please note that tutorial times and venues will be organised independently with your teaching tutor*

Module description (plus teaching arrangements, aims and objectives)

This course will focus primarily on questions raised by twentieth century 'general' philosophy of science. Questions examined will include: What is science, and how do we differentiate science from pseudo-science? Do we choose theories rationally? Does science aim to tell us about the unobservable world, and, if it does, does it succeed? What do key scientific concepts, like explanation and natural law, mean? What is the relationship between the different levels of, or theories of, science?

Nb. Materials, including some readings and lecture notes, will be posted on the KEATS site for the module. Students should ensure they have access to this.

Assessment methods and deadlines

- **Formative assessment:** 2x1500 word essays
  - 1\(^{st}\) formative essay due: 5pm Friday 31\(^{st}\) October
  - 2\(^{nd}\) formative essay due: 5pm Friday 12\(^{th}\) December

  Unless otherwise specified by your module tutor, essays may address any of the questions suggested below, as long as the two essays are based on questions from different weeks. Any essays received past the deadline without prior permission or an extremely good excuse will not be accepted.

- **Summative assessment:** 1 x 2 hour exam in May or June

For both formative essays, please answer the questions exactly as asked. You should not write your own essay question unless you have explicit permission from both GTA and module tutor.
Books and Resources

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. – Part one only.

Classic Texts
(Roughly in order of relevance to the module – Quine and Popper won’t be as extensively discussed as some others, but are very influential in the field)


Collections

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

Other Resources

- [Stanford Encyclopedia of Philosophy](https://plato.stanford.edu) - Please ensure you respect the Encyclopedia’s citation policy.
Lecture Schedule

- **Week One**: Background and Logical Empiricism
- **Week Two**: Evidence and Science: Induction and Confirmation
- **Week Three**: The Fall of Logical Empiricism: Popper, Quine and Kuhn.
- **Week Four**: Laws of Nature and the Unity of Science
- **Week Five**: Scientific Explanation (Nb. Lecture moved to 12-1pm Monday, 20th Oct, room S-2.23)

READING WEEK – FIRST FORMATIVE ESSAY DUE 5pm Friday 31st October

- **Week Six**: Relationships Between Theories: reduction and emergence
- **Week Seven**: Theory change and rationality
- **Week Eight**: Realism and Anti-Realism: the arguments
- **Week Nine**: Anti-Realism: constructive empiricism
- **Week Ten**: More Ways to be a Realist: theoretical, entity, and structural realism

SECOND FORMATIVE ESSAY DUE 5pm Friday 12th December

Detailed Lecture Outline (including suggested essay topics and readings):

Some notes on the readings:

- Required reading is just that – required! You should come to class having read this in detail and be able to give a summary of its content if asked.
- Although it’s not required, it’s highly advisable to be reading at least one additional text each week, and you will need to read several more when you come to write your essays.
- That said, there’s more material listed below than could reasonably be covered in a term; don’t feel that you should be on top of all the questions, or all the readings.
- Links to required reading will be posted on KEATS, or in some cases a copy of the book will be placed on reserve at the Maughan library.
- Some of the articles below have hyperlinks to online content – even where not linked, most journal articles are available online – Google scholar is a helpful resource.
- In case of (genuine!) difficulty obtaining any readings, please email me.
- If you have questions about any of the content of the course, clarificatory or otherwise, please post them on the Blikbook page for the course, which is linked to in KEATS. You can post there anonymously if you prefer. I will not answer questions about content over email (although I’m of course happy to answer more personal questions in this way.)
**Week One: Background and Logical Empiricism**

**Questions:**
- What are the main features of the positivist conception of science? What difficulties does positivism face as an account of the content of scientific theories?
- Which – if any – kinds of sceptical scenario ought scientists to take seriously?

**Required reading:**
- Godfrey-Smith, Peter (2003), *Theory and Reality: An Introduction to the Philosophy of Science*, University of Chicago Press, Ch.2
- Schlick, Moritz (1948), *Positivism and Realism*, Synthese, volume 7, issue 1, p.478

**Additional reading (week one):**
- Psillos, Stathis (1999), *Scientific Realism: How Science Tracks Truth*, ch.1

**Week Two: Evidence and Science: Induction and Confirmation.**

**Questions:**
- Do either of the problems of induction (Hume's or Goodman's) pose a particular problem for scientific knowledge? If so, how?
- Does observation of a white swan confirm the hypothesis that all Ravens are black? If not, why not?
- Explain and evaluate the Bayesian view of how evidence supports a scientific theory.

**Required reading:**
- Either:

**Additional reading:**
- R. Carnap (1968), *Inductive Logic and Inductive Intuition*, Studies in Logic and the Foundations of Mathematics, Vole 51, p.258. (KCL don’t have online access to this, but you can find a pdf of the original proofs (annotated by Carnap!) here: [http://digital.library.pitt.edu/u/ulsmanuscripts/pdf/31735061816702.pdf](http://digital.library.pitt.edu/u/ulsmanuscripts/pdf/31735061816702.pdf)
**Week Three: The Fall of Logical Empiricism: Popper, Quine and Kuhn**

**Questions:**
- Is all observation theory-laden in a way that undermines claims to scientific knowledge?
- Why are there so few logical empiricists around nowadays (or: what really killed logical empiricism?)?
- How well does Popper’s account of falsification capture the methodology of scientists?

**Required reading (week 3):**
- N. R. Hanson, *Patterns of Discovery*, Ch.1, 2.
- T. Kuhn, *The Structure of Scientific Revolutions*, Ch. 10.

**Additional reading:**
- D. Gillies, *Philosophy of Science in the 20th Century*, Part III.

**Week Four: Laws of Nature and the Unity of Science**

**Questions:**
- Describe and evaluate one account of laws of nature.
- Do exceptionless, universal laws of nature really exist?
- What additional problems are raised by putative laws of nature that mention probabilities?

**Required reading:**

**Additional reading:**
Week Five: Scientific Explanation

Questions:
- Describe and evaluate one account of scientific explanation.
- Is it plausible that all possible scientific explanations are captured by a single account? If not, why not? If it is, which account has this broad applicability?
- Can we make do without an account of explanation?

Required reading:
- Either:
  - W. Salmon (1998), *Causality and Explanation* (OUP) Ch.4
  - M. H. Salmon et al (1992), *Introduction to the Philosophy of Science* (Prentice-Hall) Ch.1

Additional reading:
- Hempel and Oppenheim (1948), 'Studies in the Logic of Explanation', Philosophy of Science, 15:2, pp.135-175.

Week Six: Relationships Between Theories: reduction and emergence

Questions:
- How plausible is the claim that the special sciences can be 'reduced' to physics?
- What is Nagel's account of reduction? Does it plausibly apply to any pairs of theories? If not, should it be jettisoned?

Required reading:
- Nagel, E (1961), *The Structure of Science*, (Routledge) Ch. 11
Additional Reading (week 6):

Week Seven: Theory change and rationality

Questions:
- In what sense, if any, are different paradigms `incommensurable'?
- What, if anything, is preserved when theories change?
- Does the existence of scientific revolutions threaten science's claim to be a rational enterprise?

Required reading:

Additional reading:
- Peter Godfrey-Smith (2003), Theory and Reality, Ch. 5–9.

Week Eight: Realism and Anti-Realism: the arguments

Questions:
- Does either the underdetermination of theory by data or the pessimistic meta-induction succeed in undermining the plausibility of scientific realism?
- Explain the difference between local and global forms of the 'no miracles' argument. How successful are they?

Required reading:
- Either:
  - Peter Godfrey-Smith (2003), Theory and Reality, Ch. 12
  - J. Ladyman, Understanding Philosophy of Science Chapter 5 (pp. 129-161).
- Stathis Psillos (1999), Scientific Realism: How Science Tracks Truth (Routledge, London), Ch. 4 and 5.
**Additional reading (week 8):**


**Week Nine: Anti-Realism: constructive empiricism**

**Questions**

- What is constructive empiricism? How does it differ from, and is it preferable to, other forms of empiricism?
- Can the constructive empiricist satisfactorily distinguish observable from unobservable phenomena?

**Required reading:**


**Additional reading:**


**Week Ten: More Ways to be a Realist: theoretical, entity, and structural realism**

**Questions:**

- Which form of realism can best be defended?

**Required Reading:**

Additional reading (week 10):

- Ian Hacking, (1982), *Experimentation and scientific realism*, Philosophical topics. 13: 71-87