

# Introduction to the Philosophy of Science

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Philosophy 225, HSB-204

M, Th 12.35-1.55

Office hours: Tu 3.30 – 4.30, and by appointment, Philosophy Dept, 5th floor, 106 Somerset St.

## Description

We will be considering a few of the classic questions in the philosophy of science: What makes something a science? How does scientific reasoning work? What (if anything) justifies this reasoning? How do scientific theories change over time? Are scientific theories true? How 'objective' is science?

By the end of this course, students should be: familiar with several key issues in the philosophy of science, comfortable discussing complex ideas, and able to analyse and construct philosophical arguments.

## Requirements

### Participation (15%)

Attendance will be taken at each meeting, and participation in discussion is required. For each meeting, two of you will be made 'designated responders'. This means that you will be tasked with emailing me two short, thoughtfully constructed questions or comments on the reading for that meeting, the day before the meeting. I may then call on you during the meeting to share your comment or question with the class. You will all have to do this *three times* in the course of the semester. Your participation grade will be based on these reading responses together with your contributions to class discussion.

### Midterm exam (25%)

This will be on *Monday 4<sup>th</sup> Nov*. It will be based on the material we will have covered so far. It will be a combination of multiple-choice questions and short essay questions. Missed exams will receive a grade of zero, except in documented serious circumstances.

### Short writing assignments (25%)

There will be three short writing assignments (no more than 300 words each) spread throughout the semester. These will be designed to help you develop the skills you will need for your final paper (e.g. extracting and explaining an argument from a passage.)

### Final paper (35%)

Around 1000 – 1200 words, due on *Friday 13<sup>th</sup> Dec*. You will have a choice between a variety of quotations/short passages. You will be asked to discuss one of them (i.e. explain the author's claim, and evaluate an argument for/against it). Before writing this paper, you should come to office hours to discuss your ideas with me.

## Guidelines

- Every week there will be 1-2 main readings assigned (usually about 20 pages total.) Readings will all be available on Sakai. Doing the reading is absolutely necessary for being able to follow and participate in class discussion. You should budget around *4 hours* total of work outside of class per week; if it's taking you significantly less, you probably aren't reading carefully enough! (I also strongly encourage you to do the 'background' readings, from Peter Godfrey-Smith's excellent introductory text – you should find them very helpful. And there are several extra readings too, which you should do whenever you feel like exploring a topic further.)
- It is everyone's responsibility to maintain a fun and healthy class environment. Listen carefully to what your classmates have to say, do not interrupt and be respectful when you speak. Philosophical discussions should be cooperative, not competitive – don't worry about impressing anyone! If you're not following the discussion, please speak up.
- Please refrain from using a laptop in class – not only is it distracting for you, it's distracting for others too (<https://www.chronicle.com/blogs/linguafranca/2014/08/25/why-im-asking-you-not-to-use-laptops/>). (And – needless to say – you shouldn't be using your phone or other electronic devices!) If anyone needs or strongly prefers to use a laptop for the purpose of taking notes, please come and see me. It will be helpful to print out a copy of the readings and bring it with you to class.
- I highly discourage you from missing classes, not just because it will affect your participation grade but also (and mainly) because most of the topics discussed in class will be presupposed later on. If for any reason you have to miss class, please email me to let me know. I'll be happy to meet outside of class if you need help catching up.
- Written assignments must be turned in via Sakai. From the due date, there will be a two-day grace-period with no lateness penalty; after that the penalty will be 2.5 points per day. Exceptions only for documented serious circumstances; technological mistakes are not excuses.
- Don't cheat! Your writing will run through plagiarism software, and penalties can be severe (automatic failing grade, and possibly worse.) You can consult Rutgers' academic integrity policy here: <http://academicintegrity.rutgers.edu>.
- Make use of the office hours! I'm there to help you; if there's anything from class discussion you want to go over – or you have any other questions – please come along. If you can't make the time, get in touch and I'll be happy to schedule an appointment. I expect all of you to come to office hours at least once – especially when it comes to preparing for the midterm and writing your final papers.

## Schedule

### Introduction (Week 1)

Background: P. Godfrey-Smith, *Theory and Reality: An Introduction to the Philosophy of Science*, ch.1

### What distinguishes science from 'pseudo-science'? (Weeks 2 – 4)

#### *Popper*

K. Popper, "Science: Conjectures and Refutations", sections 1 – 2

Extra: I. Lakatos, "Science and Pseudoscience" (<http://www.lse.ac.uk/philosophy/science-and-pseudoscience-overview-and-transcript/>)

Background: Godfrey-Smith ch.4

#### *Cases of pseudo-science*

M. Ruse, "Creation-Science Is Not Science".

P. R. Thagard, "Why Astrology is a Pseudoscience".

Extra: C. McKinnon, "Should We Tolerate Climate Change Denial?"

### Confirmation (Weeks 5 – 9)

#### *Puzzles of confirmation*

D. Hume, *An Inquiry Concerning Human Understanding*, Section IV

C. G. Hempel, "Studies in the Logic of Confirmation (I.)", pp.1-15

N. Goodman, *Fact, Fiction & Forecast*, sections 3.3 – 3.5.

Extra: Strevens, pp.60 - 81

Background: Godfrey-Smith ch.3

#### *Confirmational Holism*

W. Quine "Two Dogmas of Empiricism", sections V - VI

D. Gillies, "The Duhem Thesis and the Quine Thesis"

Extra: Strevens, pp.107 - 122

Background: Godfrey-Smith ch.2 (esp sections 2.3 – 4)

#### *Bayesian Confirmation Theory*

M. Strevens, *Notes on confirmation theory*, pp.22 - 41

W. Salmon, "Rationality and Objectivity in Science or Tom Kuhn Meets Tom Bayes"

Extra: Strevens, pp.41 - 59

Background: Godfrey-Smith ch.14

[Midterm Exam: *Mon 4<sup>th</sup> Nov*]

### How objective is science? (Weeks 10 – 14)

#### *Scientific Realism*

J. R. Brown, "The Miracle of Science", pp.232 – 6

N. Cartwright, "Do the Laws of Physics State the Facts?"

Extra: P. Lipton, *Inference to the Best Explanation*, pp.192 - 8  
Background: Godfrey-Smith, ch.12

### *Kuhn*

T. Kuhn, *The Structure of Scientific Revolution*, ch. IX  
Extra: Kuhn, ch. X  
Background: Godfrey-Smith chs.5, 6

### *The theory-ladenness of observation*

J. Fodor, "Observation reconsidered"  
Extra: P. Churchland, "Perceptual Plasticity and Theoretical Neutrality: A Reply to Jerry Fodor"  
Background: Godfrey-Smith ch.10 (esp. 10.3)

### *Feminist philosophy of science*

H. Longino, "Values and Objectivity"  
E. Potter, "Standpoint Epistemologies of Science" (pp. 131-155)  
Extra: K. Okruhlik, "Gender and the Biological Sciences"  
Background: Godfrey-Smith, ch.9

[Final paper due *Fri 13<sup>th</sup> Dec*]