

Introduction to the Philosophy of Science

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Philosophy 225, Scott Hall 101

W 9:50-11:10, F 2:50-4:10

Office hours: W 9-9:50 and alternating 11:30-12:30, and by appt, 106 Somerset, 5th floor, 510

Course Description

Empirical science is an incredibly successful area of inquiry. In physics, biology, economics, and many other areas of science, we have learned a staggering amount about the world. In spite of this success – or perhaps, in part, because of it – science has been subjected to lots of criticism. Politicians, the humanities, the general public, and scientists themselves have criticized it: they have questioned scientific methods of inquiry, the objectivity of scientific investigation, the kind of knowledge achieved by various fields of science, and more.

In this course, students will explore philosophical questions concerning science and various criticisms of it. How, exactly, do scientific theories get confirmed? What distinguishes science from pseudo-science? Is science objective? What justifies inductive reasoning as it is used in science? Do the entities posited by scientific theories actually exist? As we explore these general issues, we will touch upon issues that are specific to various sub-fields of science: we will explore philosophical questions relating to biology, feminist science, quantum mechanics, and more.

Course Requirements

1. Participation (50 points).
 - Students are expected to ask questions, and occasionally work together in small groups.
 - Each student is required to attend office hours at least once. Email me if you are busy during my scheduled office hours, and we will find a different time to meet.
 - See the course websites for the rubric I will use to grade participation.
2. Written questions (50 points).
 - For each class, students should write up a question that they had about the reading.
 - That question will be submitted during class.
3. Short paper (50 points).
 - 100-125 words.
 - Due date: Feb 27.
 - Closer to the due date, a detailed description of this assignment will be posted to the course websites.
4. Final paper, two drafts (100 points per draft).
 - 1000-1200 words.

- Due dates: April 12 (first draft), May 3 (second draft).
- Closer to the due date, a detailed description of this assignment will be posted to the course websites.

For information about various course policies—for instance, the late paper policy, the grade appeals policy, and the make-up work policy—see the course websites.

1. Sakai course website.
2. My course website.

Goals for the Course

By this course’s conclusion, you should be able to

- describe several key issues in the philosophy of science,
- construct arguments in support of your views,
- present views that differ from yours in a fair and charitable manner,
- write clearly, and
- discuss complex philosophical ideas respectfully.

Plagiarism and Academic Integrity

Please adhere to the Rutgers University policies on plagiarism and academic integrity. Penalties for violations of these policies can be severe: they include an automatic failing grade for the course, and possibly worse. A comprehensive overview of those policies can be found at <http://academicintegrity.rutgers.edu/academic-integrity-policy/>.

Accessibility

This class should be a great, fun, and educational experience for everyone. And of course, everyone deserves equal access to all educational opportunities at Rutgers. Disabled students are encouraged to speak with me if that would be helpful, and to avail themselves of the services provided by the Office of Disability Services: <https://ods.rutgers.edu/>.

Schedule

Many readings will be drawn from the course textbook “Philosophy of Science: The Central Issues”, by Martin Curd and J. A. Cover. Other readings will be posted to the course’s Sakai website.

This schedule is preliminary, and subject to change. Announcements about changes in the readings—whenever they occur—will be made in class, and only later added to the

syllabus. You are responsible for keeping up with those changes. So for example, if you miss class, it is your responsibility to confirm the reading for next time.

- 1. Introduction.** Logic, arguments, and rules for discussion.
 - Jan 23: no reading.
- 2. Confirmation.** How do scientific theories get confirmed?
 - Jan 25: D. Gillies, “The Duhem Thesis and the Quine Thesis”.
 - Jan 30: C. G. Hempel, “Studies in the Logic of Confirmation (I.)”, pp. 1-15 (online).
 - Feb 1: W. Salmon, “Rationality and Objectivity in Science or Tom Kuhn Meets Tom Bayes”, pp. 518-525.
 - Feb 6: W. Salmon, “Rationality and Objectivity in Science or Tom Kuhn Meets Tom Bayes”, pp. 525-535.
 - Feb 8: J. Earman, “Success Stories” (online).
 - Feb 13: C. Glymour, “Why I Am Not a Bayesian”, pp. 131-138.
 - Feb 15: catch-up.
- 3. The demarcation problem.** What distinguishes science from pseudo-science?
 - Feb 20: K. Popper, “Science: Conjectures and Refutations”.
 - Feb 22: I. Lakatos, “Science and Pseudoscience”.
 - Feb 27: P. R. Thagard, “Why Astrology is a Pseudoscience”; M. Ruse “Creation-Science Is Not Science”.
 - Due: short-answer paper.
 - Mar 1: catch-up.
 - Mar 6: catch-up
- 4. Objectivity and subjectivity.** Are scientific facts objective or subjective?
 - Mar 8: H. Longino, “Values and Objectivity”, pp. 170-180.
 - Mar 13: S. Crasnow, “Feminist Philosophy of Science: Values and Objectivity” (online).
 - Mar 15: E. Potter, “Standpoint Epistemologies of Science”, pp. 131-148 (online).
 - Mar 27: catch-up.
- 5. Induction.** What justifies inductive inferences in science?
 - Mar 29: D. Hume, “Section IV: Sceptical Doubts concerning the Operation of the Understanding”, N. Goodman, “The New Riddle of Induction”, pp. 59-66 (online).
 - April 3: N. Goodman, “The New Riddle of Induction”, pp. 66-83 (online).
 - April 5: N. Goodman, “Prospects for a Theory of Projection”, pp. 84-101 (online).
 - April 10: catch-up.
 - April 12: catch-up.
 - Due: final paper, first draft.
- 6. Philosophy of biology** (chosen by the class). What philosophical issues arise in the biological sciences?
 - April 17: S. Okasha, “The Units and Levels of Selection” (online).
 - April 19: Q. Spencer, “Racial realism I: Are biological races real?” (online).
 - April 24: K. Okruhlik, “Gender and the Biological Sciences”.
 - May 1: S. J. Gould & R. C. Lewontin, “The Spandrels of San Marco and the Panglossian Paradigm” (online).

- May 3: catch-up.
 - Due: final paper, second draft.