

Understanding Science

Philosophy 218, Spring 2025

MW 11:40–1:00

SS 256

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Office hours: W 1:30–2:30 and by appointment

Texts: All course readings are available on Brightspace.

I strongly encourage you to read actively and to mark up the readings.

This course explores the nature of science in its social context, drawing insights from philosophy and science studies. The operation of science relies on background presuppositions and on the social organization of the scientific community. So it operates in relation to broader society, and scientific expertise is not separate from structures of power and opportunity rooted in hierarchies such as race, class, and gender. The operation of science requires value judgement in weighing the potential benefits of research against the possible costs of different errors, which means that responsible science demands attention to diverse interests.

Requirements and grading:

- 10% response papers
- 10% short papers
- 25% first midterm exam
- 25% second midterm exam
- 30% final exam

Class attendance and participation: You should come to class and participate in discussion, but the class is large enough that I won't check for this every day. Instead, participation in class activities and discussion will add to your grade, up to two-thirds of a letter grade. For example, a B could become an A–.

Response papers: You will be responsible for writing five response papers during the term. Most of these will respond to one of the class readings; one may be a short reflection paper about Showcase day.

Reading response papers may be written for any of the class readings, but each must be turned in *before* we have discussed that reading in class. The dates on this syllabus are my best guess for that, but response papers turned in after class has started to discuss the reading will not be accepted for credit.

- Each reading response should begin by quoting one or two sentences from the reading which you think best provide the central thesis of the reading. *Often the thesis is not concisely stated on the first page!*
- The quoted passage should be in quotation marks and you should indicate which page of the reading it appears on.
- The reading response should then include an explanation of the thesis in your own words. What **reasons** does the author give for believing the thesis? Why do they think it matters?
- The part in your own words should be at least 250 words.

Short papers: You will be responsible for writing two short papers (750–1200 words) on assigned topics. An assignment will be available after each midterm exam, with the paper due before the start of the following class period.

Exams: There will be three in-class exams. The final exam will be cumulative.

Paper grades: Papers will be marked ✓, ✓+, or ✓-. A grade of ✓ is full credit, and completing all the work with a ✓ will give you an A for that part of your grade. ✓+ is especially good. ✓- falls short of expectations. A response paper that does not address the assignment will count for zero, but you may decide to do another one to complete the required five.

Academic honesty: Cheating will not be tolerated. Papers and exam answers should be your own words. Using an AI system like ChatGPT or Copilot to write the papers is cheating.

Absences: If you will need to miss exam or due dates for foreseeable reasons, you should discuss them with the professor at the beginning of the term. If you are sick— or might be— then you should not come to class. You are welcome to follow up in office hours about material you miss.

Schedule of topics

This is a provisional and approximate schedule. I have indicated which readings we will discuss in each week, but even this might be nudged one way or another. I will always announce in class what we will be doing at the next meeting. If we get ahead or behind the schedule on content, it will change what's on the exam rather than the date of the exam.

Week 1 Jan 22

Introduction

Week 2 Jan 27, 29

How should you decide what to believe?

read: Peirce, "The Fixation of Belief"

Kinds of inference

read: notes on inference

Week 3 Feb 3, 5

Demarcation

read: Laudan, "The Demise of the Demarcation Problem"

Week 4 Feb 10, 12

Norms of science

read: Merton, "The Normative Structure of Science"

Scientific expertise

read: Collins+Pinch, "ACTing up"

Week 5 Feb 17, 19

Review

FIRST EXAM Wednesday, Feb 19

Week 6 Feb 24, 26

SHORT PAPER #1 due Feb 24

The analogy between theories and maps

(no reading)

Observation and experiment

read: Pinch, "Towards an Analysis of Scientific Observation"

Week 7 Mar 3, 5

Observation and experiment (continued)

What makes science significant?

read: Kitcher, "Scientific Significance"

Week 8 Mar 10, 12

Scientific significance (continued)

Women in science

read: Kathleen Okruhlik, "Gender and the Biological Sciences"

SPRING BREAK! no class

Week 9 Mar 24, 26

Women in science (continued)

read: Oreskes, "Objectivity or heroism?"

Week 10 Mar 31, Apr 2

Review

SECOND EXAM Wednesday, Apr 2

Week 11 Apr 7, 9

SHORT PAPER #2 DUE Apr 7

Case study: genetics and IQ

read: Gould, "The hereditarian theory of IQ"

Causal inference

*handout on causal inference

Week 12 Apr 14, 16

Science and values

read: Douglas, "The structure of values in science"

Crafting doubt and the Tobacco Strategy

read: Fernández Pinto, "To Know or Better Not To"

Week 13 Apr 21, 23

Tobacco Strategy (continued)

Case study: Climate change

read: Oreskes, "The Scientific Concensus on Climate Change"

Week 14 Apr 28, 30

Climate change (continued)

SHOWCASE DAY Apr 30, no class

Week 15 May 5

Conclusion

FINAL EXAM F May 9, 10:30–12:30

General education

This course satisfies the *Humanities* and *Challenges for the 21st Century*, and *Diversity: Equity, Inclusion, and Social Justice* General Education requirements. Like all Gen Ed courses, this course. . .

- Offers explicit understandings of the procedures and practices of disciplines and interdisciplinary fields.
- Provides multiple perspectives on the subject matter, reflecting the intellectual and cultural diversity within and beyond the university.
- Emphasizes active learning in an engaged environment that enables students to be producers as well as consumers of knowledge.
- Promotes critical inquiry about the assumptions, goals, and methods of various fields of academic study and the interpretive, analytic, and evaluative competencies central to intellectual.

As a *Humanities* course, this course provides. . .

- An understanding of the continuing relevance of the objects of study to the present and to the world outside the university.
- An ability to employ the terms and understand the conventions particular to the disciplines (Philosophy of Science and Science Studies).
- An ability to analyze and assess the strengths and weaknesses of ideas and positions along with the reasons or arguments that can be given for and against them.
- An understanding of the nature of the texts, artifacts, ideas, or discourse of the discipline and of the assumptions that underlie this understanding, including those relating to issues of tradition and canon.

As a *Challenges for the 21st Century* course, this course provides. . .

- Knowledge and understanding of the historical roots, contemporary manifestations, and potential future courses of important challenges students may encounter as they move into the world beyond the university;
- Familiarity with these challenges in areas such as cultural diversity and pluralism, science and technology, social interaction, ethics, global citizenship, and/or others;
- An integrated understanding of how challenges often affect individuals and societies simultaneously in many of these areas;
- An appreciation for interdisciplinary approaches to understanding contemporary and future challenges.

As *Diversity: Equity, Inclusion, and Social Justice* course, students will:

- describe the historical and contemporary societal factors that shape the development of individual and group identity involving, at minimum, race, class, and gender;
- analyze the role that social structures and systems play in the creation and perpetuation of the dynamics of power, privilege, oppression, and opportunity;
- apply the principles of rights, access, equity, and autonomous participation to past, current, or future social justice action.