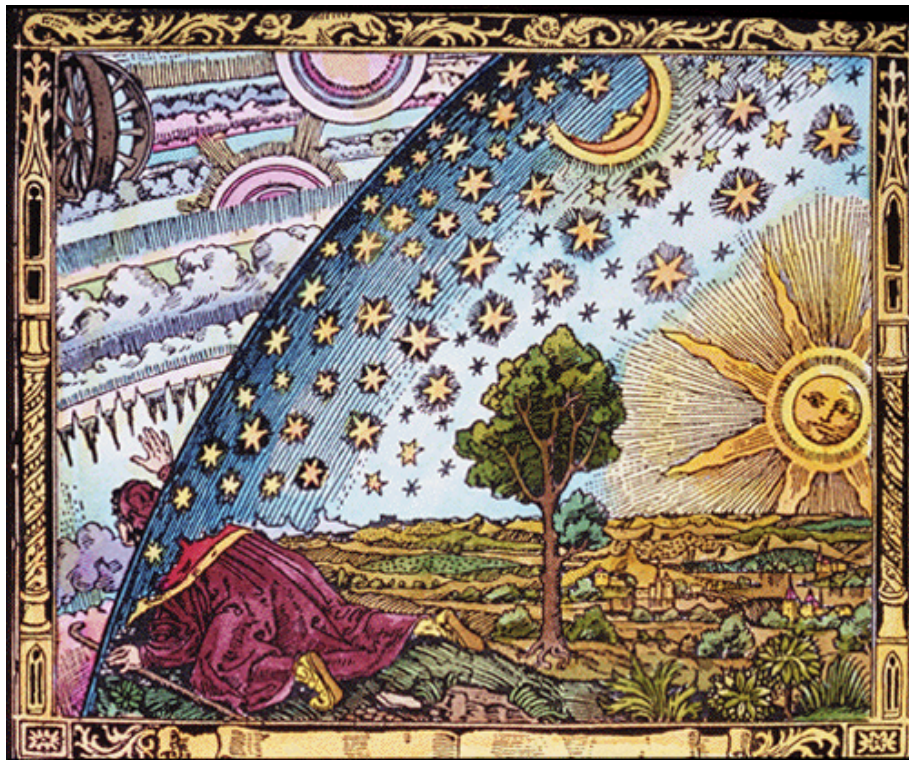


PHIL 145

PHILOSOPHY OF SCIENCE



Spring 2025

Instructor: Kerry McKenzie

kmckenzie@ucsd.edu

Classes: TuTh 11-12.20 RWAC 0462

Office Hour: 2-3pm Thursday pm (RWAC 0499)

Syllabus.

1. Tu Apr 1st. Welcome and Overview.

- No reading.

2. Th Apr 3rd. Themes from the Scientific Revolution

- Ladyman, *Understanding Philosophy of Science* Intro and Chap. 1, up to 1.3

3. Tu Apr 8th. Deduction, Induction, and Inductivism

- James Ladyman, *Understanding Philosophy of Science*, Remainder of Chap 1

4. Th Apr 10th. The Problem of Induction I

- Ladyman, *Understanding Philosophy of Science*, Chapter 2, up to 2.3.

5. Tu Apr 15th. The Problem of Induction II

- Earman and Salmon, *Introduction to the Philosophy of Science* Chapter 2, Part 2
- Marc Lange, chapter from 'Why trust science?'

6. Th Apr 17th. Introducing Unobservables.

- Earman and Salmon, *Introduction to the Philosophy of Science* Chapter 2, Part 1.

7. Tu Apr 22nd. Problems of falsification: the Duhem-Quine Problem

- Pierre Duhem, 'Physical Theory, Mathematics, and Experiment'.
- Creationism literature, to be distributed.

8. Th Apr 24th. Problems of confirmation: underdetermination of theory by data

- Kyle Stanford, 'Refusing the Devil's Bargain: What Kind of Underdetermination Should We Take Seriously?'
- Optional: Margaret Greta Turnbull, 'Underdetermination in Science: What is it and why we should care'

9. Tu Apr 29th. The problem of theory change I

- John Worrall, 'Structural realism: the best of both worlds?'

10. 📅 📅 📅 Take-home quiz due 📅 📅 📅

Th May 1st. The problem of theory change II

- Ludwig Farhbach, ‘Pessimistic meta-induction and the exponential growth of science’.

Tu May 6th. Bias and theory selection I

- Kathleen Okruhlik, ‘Gender and the Biological Sciences’.

Th May 8th. Bias and theory selection II

- Naomi Oreskes, ‘Why trust science?’ excerpts: page 75, pp. 76-104 (ie. Examples 1-3), 127-146.

Tu May 13th. Review

- No reading.

Th May 15th. Midterm

- 📖 📖 📖 In-class midterm 📖 📖 📖

Tu May 20th. The NSF

- Kyle Stanford, ‘Unconceived alternatives and conservatism in science: the impact of professionalization, peer-review, and Big Science’.

Tu May 27th. Climate Science I

- Neil Levy, ‘Due deference to denialism: explaining ordinary people’s rejection of established scientific findings’ (2017).
- Eyal excerpt.
- Eric Winsberg, ‘We Need Scientific Dissidents Now More Than Ever’, 2023.

Th May 29th. Thought experiments I

- James Robert Brown, ‘Why Thought Experiments Transcend Empiricism’

Tu Jun 3rd. Thought experiments II

- John Norton, ‘Why Thought Experiments Do Not Transcend Empiricism’.

Th Jun 5th. Envoi

- No reading.

1 What this course is about

This course concerns a topic of great social, philosophical, and personal significance: the nature and justification of scientific knowledge. We begin with some reflections about the nature of scientific justification, and hence a range of issues in the *epistemology of science*. How do we acquire knowledge of *unobservable* entities, such as quarks and electrons, or of what will happen in the distant past or future? Can we ever really be said have such knowledge? Can we at least know which scientific claims are *false*? How, if at all, do social and cultural factors obstruct or assist in the generation of scientific knowledge? How relevant is the history of science for determining how we should think about the status of the theories we have today? What epistemologies are embedded in the NSF? Why do ever more people distrust science? And what was even happening, way back at the beginning, when Galileo discovered the law of free fall through a thought experiment, setting the stage for modern science?

It is hoped that this course will be of interest both to science majors and those whose intellectual interests focus more on culture than nature, for one of the themes will be that the two cannot be strictly separated. And while some of the material will be rather formal, no prior acquaintance with formal logic, modal logic or probability theory is assumed, and you will not have to engage in too much detail with formal notions to do well in your essays (though you are welcome, and encouraged, to try). Thus when you encounter symbols in the primary texts that you are unfamiliar with, you should never be afraid to flag them up to me in class or over email. Since you will, with probability 1, not be the only person in the class flummoxed by said symbol, you will be doing us all a favor.

2 Assessment.

There are five parts to your assessment.

- Tues April 29th: take-home, pre-midterm quiz (5%)
- Tuesday May 15th: in-class essay midterm (35%)
- Tuesday June 10th, 11am: Final essay + reflection (40%)
- Participation on the discussion board (10%)
- Attendance .5 point per class (10%)

Midterm. This is a sit-down: you will see the essay questions in advance. Be prepared to write on one.

Final papers. You will produce two pieces of writing, but upload a single file by midnight on June 8th. One will be a regular philosophy essay of about 1,500 words; the other will be a shorter reflection of a paragraph or two what you think the value (if any!) of thinking about philosophy of science consists in. The latter will, if it's good, boost you to the next grade up (so B+ to A-).

Guidance on essays. I will distribute a selection of questions for both the midterm and the final essay; you are to write on **one** of these (i.e. not all!). With my permission you may write on a question of your own construction but you **must** have this approved by me in advance. In class we will discuss in more detail the sort of thing I'm looking for you in your term paper and mini exam essays. But in grading your essay I will be looking for four (not entirely independent) things:

Comprehension: a demonstrated understanding of the ideas and concepts discussed in the essay.

Clarity: your presentation of the ideas and concepts in a clear and concise manner.

Argumentation: your use of a sound argumentative strategy (ie an essay with a well-supported conclusion).

Engagement: independent thinking about the items under discussion.

Generally at least some successful independent thought must be demonstrated in order to receive an A-range grade. Covering only material presented in the lectures will result in a low-B range grade at best.

I reserve the right to ask you a few questions in person (perhaps over Zoom) about your essay before administering a grade. This is likely just because I do not understand something you've written; it will not in general be any cause for alarm.

Do not use Chat GPT or anything similar to generate any of your writing. I will be giving clear instructions for your final assignment close to submission time.

Grading scale. I will be assigning letter grades for your midterm and term paper corresponding to these marks:

$97 - 100 = A^+$	$87 - 89 = B^+$	$77 - 79 = C^+$	$67 - 69 = D^+$
$93 - 96 = A$	$83 - 86 = B$	$73 - 76 = C$	$60 - 66 = D$
$90 - 92 = A^-$	$80 - 82 = B^-$	$70 - 72 = C^-$	$< 60 = F$

The final letter grade you receive however will be 'graded to the curve', so that the top 20-30% of students will get a grade in the A range, the next 25-35% a grade in the B range, the next 25-30% a grade in the C range, and the remaining 5-25% a D or an F. This is the minimum I guarantee; if the class has worked well and no-one deserves a D or an F, the curve will be adjusted accordingly.

Academic Integrity.

UCSD is committed to academic integrity. According to their *Policy on Integrity of Scholarship*,¹

¹For the full statement, go to <https://students.ucsd.edu/academics/academic-integrity/policy.html>

“Integrity of scholarship is essential for an academic community. The University expects that both faculty and students will honor this principle and in so doing protect the validity of University intellectual work. For students, this means that all academic work will be done by the individual to whom it is assigned, without unauthorized aid of any kind.”

If you have any questions or concerns about what academic integrity requires of you, **do not hesitate to get in touch with me.**

3 Disability accommodations.

Students requesting accommodations for this course due to a disability must provide a current Authorization for Accommodation (AFA) letter issued by the Office for Students with Disabilities (OSD) which is located in University Center 202 behind Center Hall. Students are required to present their AFA letters to Faculty (please make arrangements to contact me privately) and to the OSD Liaison in the department in advance so that accommodations may be arranged.

4 What I want from you.

The intention is that you read the readings corresponding to a lecture before coming in to class. Please do not be put off by the fact that many of the readings are dense and will refer to philosophical and scientific concepts that you haven’t encountered before. The feeling of being out of your depth and not knowing enough is simply the predicament of HPS (the ‘history and philosophy of science’). However, you do feel completely at sea in this course and are worried that you cannot complete your assignments, please let me know. You have some freedom in your choice of essay topics and I’m sure that we will be able find a topic that both plays to your strengths and engages with the themes of the course.

Please write your essays double-spaced, and cite fully but judiciously.