**Philosophy of science: theory and evidence**

Semester | year

# Instructor Information

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| Instructor | Email | Office Location & Hours |
| **Kino Zhao** | yutingz3@uci.edu | Location, Time, Day |

# General Information

## Course Description

In this course, we will explore how theory and evidence interact according to contemporary philosophy of science. We will start with an overview of different accounts of how evidence is supposed to help us decide which theory to adopt and the challenges with them. We then move on to Kuhn’s influential view that theory adoption is not primarily based on evidence and discuss what we could do instead. We will discuss a few functions theories are supposed to serve. In particular, we focus on explanation, theoretical entities, causation, and laws. We discuss the role of evidence in these contexts. The last two weeks will be dedicated to a topic of students’ choice.

## Learning objectives

By the end of the class, students are expected to

* Have a basic understanding of central issues in the philosophy of science concerning confirmation, falsification, theory choice, and realism.
* Be able to read, understand, and critically engage with philosophical texts.

## Reading

Staley, Kent. *Introduction to Philosophy of Science*. Cambridge University Press. 2014

[CC] Curd, Martin and J. A. Cover, eds. *Philosophy of Science: The Central Issues*, Second Edition. Norton, 2013.

Reading materials not from these books will be posted on Canvas.

# Assessment

## Short reading response papers (50% of grade)

You will have a total of 6 chances to write short (2-3 pages) response papers. The worst grade will be dropped for final evaluation. This includes unexcused non-submission, which would receive 0.

In these papers, you will pick one of the assigned readings (at most 2/6 can be Staley’s chapters), summarize what it says in your own words, and explain whether or not you agree with it using an example. More detail at the end of the syllabus.

## Longer paper (40% of grade)

You will write a longer (5-6 pages) paper where you pick 2 or 3 readings, juxtapose them, and make an argument concerning how they relate to each other. The paper will go through an anonymous review process (described below) as well as receive comments from me. You will have a chance to revise it. The first draft constitutes 10% and the second 30%. More detail at the end of the syllabus.

## Peer feedback (10% of grade)

Each person will receive two papers from their classmates. Your responsibility is to read through them and provide 1-page long comments. Each paper will be reviewed by two reviewers as well as by me. You get full points for handing in comments on time.

# Policies

## Use of technology in class

Laptops are allowed in class. Please be mindful of what you do on your screen so as to not disturb others.

## Late submission of papers

The best way to ensure that you turn in projects on time is to start early. This gives you both time to edit your work and for unexpected sudden lack of motivation. If you anticipate submitting late, whether due to external circumstances or internal struggles, let me know as early as you can, and we’ll figure something out. If you have a chronic condition that affects your ability to work consistently, please also let me know and we can figure out workarounds.

**[insert disability service center information]**

# Course Schedule

## Week 1 – problem of induction

Staley, Ch. 1, Some problems of induction

[CC] Karl Popper, The Problem of Induction

[CC] Peter Lipton, Induction

## Module 1: dealing with evidence

## Week 2 – falsificationism

Staley, Ch. 2, Falsificationism: science without induction?

[CC] Karl Popper, Science: Conjectures and Refutations

## Week 3 – confirmation [short paper 1 due]

[CC] Wesley C. Salmon, Rational Prediction

[CC] Carl G. Hempel, Criteria of Confirmation and Acceptability

## Week 4 – the Duhem thesis

Staley, Ch. 3, Underdetermination

[CC] Donald Gillies, The Duhem Thesis and the Quine Thesis

## Module 2: dealing with theory

## Week 5 – theory choice [short paper 2 due]

Staley, Ch.4, Logical empiricism and scientific theories

Staley, Ch.5, Kuhn: scientific revolutions as paradigm changes

## Week 6 – Kuhn’s philosophy of science (1)

[CC] Thomas S. Kuhn, The Nature and Necessity of Scientific Revolutions

[CC] Thomas S. Kuhn, Objectivity, Value Judgment, and Theory Choice

## Week 7 – Kuhn’s philosophy of science (2) [short paper 3 due]

[CC] Ernan McMullin, Rationality and Paradigm Change in Science

[CC] Larry Laudan, Kuhn's Critique of Methodology

## Week 8 – non-empirical theory choice [short paper 4 due]

Ivanova, Milena. Pierre Duhem’s Good Sense as a Guide to Theory Choice, 2010, Studies in History and Philosophy of Science part A 41(1): 58-64.

Tulodziecki, Dana. Underdetermination, methodological practices, and realism, 2013, Synthese 190(17): 3731-3750.

## Week 9 – week off

## Module 3: what does a theory do?

## Week 10 – explain

[CC] Carl G. Hempel, Two Basic Types of Scientific Explanation

Salmon, W. C. (1979). Why ask, ‘Why?’? An inquiry concerning scientific explanation. In Hans Reichenbach: Logical Empiricist (pp. 403-425). Springer, Dordrecht.

## Week 11 – being true? [short paper 5 due]

Staley, Ch.10, Realism and anti-realism

Boyd, R. N. (1983). On the current status of the issue of scientific realism. In Methodology, epistemology, and philosophy of science (pp. 45-90). Springer, Dordrecht.

Wylie, A. (1986). Arguments for scientific realism: The ascending spiral. American Philosophical Quarterly, 23(3), 287-297.

## Week 12 – tell us what exist [short paper 6 due]

[CC] Grover Maxwell, The Ontological Status of Theoretical Entities

[CC] Ian Hacking, Experimentation and Scientific Realism

[CC] David B. Resnik, Hacking's Experimental Realism

## Week 13 – do causes exist?

Eberhardt, F. (2009). Introduction to the Epistemology of Causation. Philosophy Compass, 4(6), 913-925.

Reiss, J. (2017). On the causal wars. In Philosophy of Science in Practice (pp. 45-66). Springer, Cham.

## Week 14 – do laws of nature exist? [long paper first draft due]

[CC] A. J. Ayer, What Is a Law of Nature?

[CC] Nancy Cartwright, Do the Laws of Physics State the Facts?

## Module 5: students’ choice of topic

## Week 15 [long paper peer feedback due] & Week 16 [long paper final draft due]

Choice 1: unity/disunity of science

Choice 2: laws & causation in the social sciences

Choice 3: scientific reductionism

## Short reading response papers (50% of grade)

You will have a total of 6 chances to write short (2-3 pages) response papers. The worst grade will be dropped for final evaluation. This includes unexcused non-submission, which would receive 0.

For each paper, pick one of the assigned readings (at most 2/6 can be Staley’s chapters) and do the following:

First, summarize what it says in your own words, as if you are telling a friend about the plot of a novel you just read. Try not to quote the original text unless it really is a great sentence worth remembering. (You don’t usually quote from novels when talking to your friends, do you?) Try not to use outside sources, too. If you have trouble understanding it, meet with me and we’ll talk about it.

Second, state a clear attitude you have about the reading, such as “I don’t think the author is right” or “I think the view is correct” or “I think the author’s view only applies to physics but not to biology”.

Third, explain why you hold this attitude. The easier way to do this is to use an example. If you do, briefly explain the context of the example first so that the reader understands what you’re talking about. If you have an abstract argument against a paper, you can also use that instead of the example (note that this is usually harder for those without previous philosophy background)

## Avoiding plagiarism

For these papers, you can just write “response to [author’s] [paper title]” at the top of the page and you won’t need to cite this paper again. As you are writing, be very clear which views are the author’s (according to you) and which views are yours about the paper. If you quote the author, provide page numbers.

You are discouraged to use outside sources, but if you do use them, provide a citation in the APA style: <https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/in_text_citations_the_basics.html>

If you’ve consulted online sources to help understand the main text better (such as Wikipedia), include a brief note at the end suggesting that you’ve done so.

If you’ve worked with friends in this class (which is totally allowed) on the readings, include their names. Basically, if you’ve worked together to arrive at the same understanding of the same reading, that is perfectly fine. However, you should try to come up with different responses and use different examples (or use the same example differently).

## Grading scheme

You get up to 4 points for accurately summarizing the reading, up to 3 points for making a response that is reasonable and relevant to the reading, up to 3 points for clear writing, for a total of 10 points.

## Longer paper (40% of grade)

You will write a longer (5-6 pages) paper where you pick 2 or 3 readings, juxtapose them, and make an argument concerning how they relate to each other.

The 2-3 readings can be, but do not have to be, what you have written about in the short responses. You are welcome to reuse your earlier arguments (without assuming the reader has read them) or you can change your mind.

In the beginning of the paper, state a clear thesis. Your thesis should be about how your identified readings connect to each other. For example, your thesis may be “I will argue that author B misunderstands author A, which is why they appear to disagree. They don’t actually disagree.” Or “I will argue that B’s view is a necessary consequence of A’s view.” Or “I will argue that A and B hold the same view for conflicting reasons.”

After that, start with something similar to the summaries you have done for short responses, but in a way that shows how the authors’ views stand in relation with each other. For example, “concerning the thesis Z, XX says this and YY says not this”. Or “XX believes that such-and-such and YY agrees, but for a different reason”. You will not be able to do this for everything the authors have said. Instead, focus on only the part of the reading that is relevant to your thesis.

Then, start building an argument of your own. You may want to use an example, or you may want to use textual evidence.

## Avoiding plagiarism

All sources in this paper, including the original texts you are analyzing, should be referenced in the APA style: <https://owl.purdue.edu/owl/research_and_citation/apa_style/apa_formatting_and_style_guide/in_text_citations_the_basics.html> including both in-text citation and end-of-text reference list

If you’ve consulted online sources to help understand the main text better (such as Wikipedia), include a brief note at the end suggesting that you’ve done so.

If you’ve worked with friends in this class (which is totally allowed) on the readings, include their names. Basically, if you’ve worked together to arrive at the same understanding of the same reading, that is perfectly fine. However, you should try to come up with different responses and use different examples (or use the same example differently).

## Grading scheme

For a total of 40 points:

Up to 15 points for displaying accurate understanding of primary text

Up to 10 points for relevant and original argumentation

Up to 10 points for clear and logical writing

Up to 5 points for adequate formatting and citation practices