This course will offer an introduction to some central questions in the Philosophy of Science. We will begin by asking some general questions about scientific methodology—What is it? What distinguishes it from pseudo-scientific methodologies? Should we believe that scientific methodology will lead us toward truth? If so, why? How does evidence support or confirm a scientific theory? What can science teach us about the nature of reality, and how can it teach us this? In particular, does mature micro-physics give us reason to believe that the entities posited by its theories really exist?

We will then shift gears a bit, after the midterm, and look at some questions about the metaphysical status of some concepts which appear regularly in scientific practice: explanation, laws, dispositions, causation, and chance. During this section of the course, we will be considering questions such as What is it for something to be a law of nature? In virtue of what do some facts explain other facts? What is a chance? When I say that the chance that the coin lands heads is 50%, what do I mean? What is it for two events to be causally related? What makes claims about what would have happened true or false? What makes claims about object’s dispositions true or false?


Your final grade in this course will be determined by 4 components:

- Comprehension Quizzes 25%
- Problem Sets 25%
- Midterm 25%
- Final 25%

Comprehension Quizzes: At the beginning of each class, there will be a short quiz on the reading for that class. These quizzes won’t be asking you complicated conceptual questions about the reading. They will just be asking questions to test for basic comprehension. So long as you do the reading for each class and make a sincere effort to understand what the authors are saying, these quizzes shouldn’t cause you too much trouble.

Problem Sets: Understanding philosophy of science requires a certain familiarity with some basic notions of deductive logic and probability. During the first half of the course, after these topics are covered, you will be given a problem set on each. If you have any difficulty with the
problem sets, you should feel free to come see me in office hours, and we can think some of
the problems through together. During the second half of the course, we will use some of the
logic and probability theory we've learned in the first half of the course to critically evaluate
some positions in the philosophy of science. In the problem sets for this half of the semester,
you will be asked to use these tools to work out some implications of the views we are studying.

**Midterm and Final:** There will be a midterm on March 11th and a (non-cumulative) final on
April 30th (from 8:00–10:00). Prior to the midterm and the final, I will hand out a collection
of ten or so potential essay prompts. The essays on the test will be drawn from these. So long
as you have been following along all semester and spend adequate time preparing, these tests
shouldn't cause you too much trouble.

**Schedule**

How are scientific theories tested and confirmed?

Ladyman, *Introduction* (1/9)
Hempel, ch. 2 (1/14)
Ladyman, ch. 1 (1/14)
*Notes on Logic* (1/16, 1/23)
Hempel, ch. 3 (1/28)

Can we provide a good justification of the scientific methodology? Is our justification of this
methodology circular?

Michael Williams, *Induction*, selections (1/30)
Ladyman, ch. 2 (1/30)

Is science even in the business of confirming or gathering evidence in favor of theories at all?
Might science just be in the business of falsifying theories?

Ladyman, chapter 3, selections (2/4)
Popper, *Conjectures and Refutations*, selections (2/4)
Hilary Putnam, *On the “Corroboration” of Theories*, selections (2/6)
Ladyman, ch. 3, selections (2/6)

**1st problem set due** (2/4)

Can we formally specify when a piece of evidence supports a hypothesis?

Goodman, *The New Riddle of Induction* (2/11)
Hempel, Chapter 4 (selections) (2/11)
Strevens, *Notes on Bayesian Confirmation Theory*, §1–4 (2/13)
Strevens, *Notes on Bayesian Confirmation Theory*, §6.1 & 8.1 (2/18)

Does the empirical success of our microphysical theories give us sufficient reason to believe
that the unobservable entities postulated by those theories really exist?

Ladyman, ch. 5: *Scientific Realism* (2/25)
Ladyman, ch. 6: *Underdetermination* (2/27)

**2nd problem set due** (2/27)

What will be on the Midterm?

Midterm Review Questions (3/11)
Midterm (3/13)
What makes something a *law of nature*, as opposed to a merely accidentally true universal generalization?

- Hempel, ch. 5 (selections) (3/18)
- Lewis, *Humean Supervenience Debugged*, selections (3/20)

What are probabilities and chances?


What makes an explanation good? In virtue of what do some facts explain other facts?

- Hempel, ch. 5 (4/1)
- Salmon, *Scientific Explanation* (4/1 & 4/3)

What is it for one event to cause another event?

- Mackie, *Causes and Conditions* (§§1 & 2) (4/8)
- Cartwright, *Causal Laws and Effective Strategies* (selections) (4/10)

**3rd problem set due** (4/8)

We sometimes say things like ‘the glass is fragile’ and ‘if the glass were dropped, then it would have shattered’. What makes these claims true? Can we use one of these claims to understand the other? Can we understand causation in terms of claims like these?

- Goodman, *Counterfactuals* (4/15)
- Martin, *Dispositions and Conditionals* (4/15)
- David Lewis, *Causation* (4/17)

**4th Problem Set Due** (4/17)

What will be on the final?

- final review (4/22)
- **final** (4/30), 8:00–10:00

Cheating and Plagiarism will not be tolerated. If you are found cheating on any assignment, you will automatically receive a failing grade for the course.