

**PHIL 460: Philosophy of Science  
Syllabus, Winter 2021**

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**Pronouns:** he/him/his

**Class time:** MWF, 10:00-11:20am  
**Location:** Zoom  
**Office hours:** MW, 11:30am-12:30pm,  
or by appointment

## 1. Course description

The knowledge produced by the sciences ranks among humankind's greatest achievements. In this course, we will examine these achievements in order to better understand what science is and how it works. We will consider questions such as: What are scientific theories, and how are they discovered and justified? How does scientific knowledge change over time? What distinguishes science from pseudoscience? What are scientific experiments good for? What role, if any, should value judgments play in science? Do we have good reason to believe our best current scientific theories are true? Students who take this course will be exposed to a variety of views on each of these topics, and will be trained to evaluate them and to develop and defend their own views. Students will leave the course prepared to engage with science both as citizens of a science-dominated world and, where relevant, as scientists themselves.

## 2. Course texts

There is one required text for this course:

- Angela Potochnik, *Idealization and the Aims of Science* ([University of Chicago Press](#), \$36)

You are expected to acquire your own copy of this text, either hard-copy or digital. The price listed is for the paperback, if you buy it from the press itself; you can also rent an e-book version for \$10. *If acquiring this text poses an undue financial burden, please let me know.* We will begin reading this book in Week 8 (Feb 22), so you have some time to acquire it.

All other required readings (and optional readings) will be posted to the course Canvas page.

This is an upper-division course, so we will focus on reading and discussing research papers rather than use an introductory textbook. That said, you may find the following introductory textbooks provide helpful background material. *Neither is required, and there will be no assigned readings from either of them:*

- Peter Godfrey-Smith, *Theory and Reality: An Introduction to the Philosophy of Science* ([University of Chicago Press](#))
- Gillian Barker and Philip Kitcher, *Philosophy of Science: A New Introduction* ([Oxford University Press](#))

### 3. Course structure

Most weeks of this course will follow the same structure. Our “Monday” meeting will be asynchronous: I will provide recorded lectures for you to peruse at your leisure. Our Wednesday and Friday sessions will be synchronous, focusing on discussion of research papers or (at the end of the course) Angela Potochnik’s book.

While you are permitted to watch the recorded lectures whenever you find most convenient (or not watch them, though I *really* don’t recommend this), I expect you will find the W/F readings *much* more difficult if you have not watched the lecture videos first.

The exceptions to this general pattern are:

- Week 1: Monday meeting will be synchronous (introducing the course)
- Week 3: no class Monday (MLK day), Wednesday asynchronous
- Week 7: no class Monday (President’s day), Wednesday asynchronous

On the reading schedule, synchronous sessions have a grey background; asynchronous sessions have a white background.

There is a course discord server, which you can join here: <https://discord.gg/QEpSTU3eUN>. This will be used for asynchronous discussion and announcements.

### 4. Grading

**Grading system.** In this course, *you will grade yourselves*. At the end of the term, you will (a) assign yourself a grade and (b) write a justification of the grade you have given yourself, drawing on feedback I have given you throughout the semester. You must grade yourself fairly; I reserve the right to assign a different grade than you have given yourself (this might be higher or lower than your self-assigned grade). The purposes of self-grading include:

- encouraging you to take responsibility for your own education
- encouraging you to reflect on your own learning and performance
- encouraging you to attend to the *content* of my feedback, rather than a numerical score
- allowing me to focus my energy on giving you useful feedback, not assigning a grade

You will assign grades on the 0-4.0 scale, with 0.7 as the cutoff for passing the class.

At various points during the semester (see “Assignments” below), students will write provisional self-assessments and receive feedback on them. The purpose of this is to (a) help you calibrate their sense of how they are doing, (b) give you practice writing justifications of your grade before you turn in the justification that really counts, and (c) encourage you to reflect on your own learning *throughout* the course, and not merely at the end.

This policy applies only to undergraduate students; graduate students will, alas, simply be assigned a grade.

## 5. Assignments (graduate students)

Graduate students in this course will be required to write a final paper (4500-5500 words) on a topic of their choosing. This paper must be argumentative (i.e., not merely a lit review). This will be their only assignment. Detailed instructions will be provided separately.

## 6. Assignments (undergraduate students)

*No point values are given, as I want you to think holistically in giving yourself a grade.*

**Self-assessments.** At four points during the semester (see reading schedule), students will turn in self-assessments, in which they will (a) assign themselves an overall course grade and (b) write a brief justification of their assigned grade. Detailed instructions will be provided closer to the due date for these. Graded for completion only.

**Reading responses.** On discussion days (Wed, Fri, weeks 1-7), students will come to class with a short response to the reading prepared, to be used in class discussion. I will provide explicit instructions on what is expected for each; they will be designed to build philosophical skills (e.g., recognizing theses, summarizing arguments, evaluating arguments, etc.). Responses should generally not be longer than a paragraph. There will be twelve total, of which you can miss two, no questions asked. However, the first two are strictly required.

**Short papers.** Students will write two short (500-600 words) papers in which they (a) select a primary reading they found especially interesting, (b) summarize the thesis and main argument, and (c) provide their own original evaluation of that thesis and argument.

**Final paper.** At the end of the course, students will turn in a longer paper (1500-1800 words) in which they take a stand on one of the debates we have discussed in this course. For most students, this will be an expanded version of one of the two short papers, engaging with more of the primary literature.

**Final paper revision (W-credit).** Students who wish to receive a W credit for this course are required to revise their final paper in light of my comments. Note that this will require turning in this paper earlier than otherwise (see reading schedule).

**Final paper outline and annotated bibliography.** Before writing their final paper (see reading schedule), students will turn in an outline and annotated bibliography, on which I will provide feedback and pointers. Detailed instructions will be provided later.

**Peer critique and paper draft.** Before turning in their final paper (see reading schedule), students will give each other feedback. This feedback will be shared with me.

**Course engagement.** Students are expected to engage with the course material. What this means is open-ended: it includes participating in class discussions, posting to the course Discord server, attending office hours, sending me emails with questions about the material, discussing course material with your friends, using it in other classes, and more that I simply haven't thought of.

## 7. Course policies

**Disability and accommodation policy.** It is my intention that this course be made accessible to all students. This means, minimally, that I will grant any accommodations required by the Disability Resources Center. However, some of you may need accommodations not formally certified by that office. If any aspect of the class poses a hardship for you, please talk to me, and we can work together to develop a plan for you to fulfill the course requirements.

**Late assignment policy.** There are no late penalties in this course. If you need an extension on an assignment, you can have one, no questions asked. I only request that you let me know that you need one and give me a sense of when you will turn in the assignment. (You do not need to tell me *why* you need it.) Please be courteous: *this policy only works if most students turn in most assignments by their initial due date.*

Note for students taking a W-credit: I cannot accommodate extensions of more than a day on the final paper, as I need to be able to get you feedback in time for you to complete the revisions.

**In-class etiquette.** Philosophy is a social endeavor. People engaged in philosophy do not simply think in solitude, but rather engage in discussion with others. That will be true in this class as well: you will be encouraged to discuss the topics we cover with your fellow students. You are even encouraged to disagree with them. It is therefore imperative that you understand how to do so respectfully. We will discuss this early on in the semester and collectively agree on standards for discussion to which we will hold ourselves. Here are some ground rules:

- Think of those with whom you disagree not as opponents but as fellow seekers of the truth. Even if you disagree, you are *collaborating*.
- Acknowledge the person you are responding to, by name if possible.
- Address your comments to the arguments that have been offered. Never attack the intelligence or character of the person who argued for them.
- On some issues, you may have strongly held opinions. That is ok, but it is important to recognize that people who disagree with you are doing so in *good faith*. Before getting angry with or dismissive of another person, try to understand why they think the way they do.

**Group work.** Group work is permitted for all assignments in this course, so long as *the final product you turn in is your own work*. In other words, you may discuss assignments with your peers, you may compare your work and give each other feedback, and so forth. However, you must write up the final assignment yourself; failure to do so is one form of plagiarism (see below).

**Plagiarism.** In this course, you are expected to turn in work reflective of your own effort. I encourage you to discuss assignments with other students, but what you turn in must ultimately be your own work. You must also cite any sources that inform your work. We will talk more about expectations for this in class, and I will work with students to correct minor violations. Major violations (such as purchasing essays online) will be reported to the school's university office.

## 8. Reading Schedule

Date	Topic	Required Readings (due on date listed)	Assignments (due on date listed)	Optional Readings (by week)
Week 1 Mon Jan 04	Introduction	<i>no reading</i>	<i>no assignments</i>	IMPORTANT NOTE:  white background = asynchronous lecture  grey background = synchronous discussion
Week 1 Wed Jan 06	What is science? (Discussion)	(complicated; see reading response assignment)	<b>Reading response #1</b> (hard requirement)	
Week 1 Fri Jan 08	What is philosophy of science? (Discussion)	(complicated; see reading response assignment)	<b>Reading response #2</b> (hard requirement)	
Week 2 Mon Jan 11	Confirmation & theory testing (lecture)	<i>no reading</i>	<i>no assignments</i>	Mackonis, "Inference to the best explanation..."
Week 2 Wed Jan 13	Confirmation (discussion)	Sprenger, "Hypothetico-Deductive Confirmation"	<b>Reading response #3</b>	Musgrave, "Why Did Oxygen Supplant..."
Week 2 Fri Jan 15	Falsification (discussion)	Popper, "Science..." Lakatos, "Science and Pseudoscience"	<b>Reading response #4</b>	Norton, "A Material Theory of Induction"
Week 3 Mon Jan 18	<i>NO CLASS - MLK DAY</i>			Amundson, "Two Concepts of Constraint"
Week 3 Wed Jan 20	Scientific revolutions (lecture)	<i>no reading</i>	<i>no assignments</i>	Chang, <i>Is Water H<sub>2</sub>O?</i>
Week 3 Fri Jan 22	Scientific revolutions (discussion)	Kuhn, "The nature and necessity of scientific revolutions"	<b>Reading response #5</b>	Davies, "Kuhn on incommensurability..."
Week 4 Mon Jan 25	Scientific experiment (lecture)	<i>no reading</i>	<b>Self-assessment #1</b>	Baetu, "On the possibility of crucial experiments..."
Week 4 Wed Jan 27	Exploratory experiments (discussion)	Steinle, "Entering New Fields..."	<b>Reading response #6</b>	Colaço, "Rethinking the role of theory..."  Franklin, "Exploratory Experiments"
Week 4 Fri Jan 29	Historical science (discussion)	Cleland, "Methodological and Epistemic..."	<b>Reading response #7</b>	Novick et al., "Kon-Tiki Experiments"

<b>Date</b>	<b>Topic</b>	<b>Required Readings</b> (due on date listed)	<b>Assignments</b> (due on date listed)	<b>Optional Readings</b> (by week)
Week 5 Mon Feb 01	Explanation (Lecture)	<i>no reading</i>	<b>Short paper #1</b>	Kitcher, "Explanatory Unification"  Lange, "What Makes a Scientific Explanation..."  Woodward, "Explanation, Invariance, and..."
Week 5 Wed Feb 03	Explanation (Discussion)	Cartwright, "The Truth Doesn't Explain Much"	<b>Reading response #8</b>	
Week 5 Fri Feb 05	Explanation (Discussion)	Woody, "How is the ideal gas law explanatory?"	<b>Reading response #9</b>	
Week 6 Mon Feb 08	Values and Science (Lecture)	<i>no reading</i>	<b>Self-assessment #2</b>	Bright, "Du Bois' Democratic Defence..."  de Melo-Martín and Intemann, "The Risk..."  Ludwig, "Ontological Choices and the Value..."  Resnik and Elliott, "Value-entanglement..."
Week 6 Wed Feb 10	Values and Science (Discussion)	Okruhlik, "Gender and the Biological Sciences"	<b>Reading response #10</b>	
Week 6 Fri Feb 12	Values and Science (Discussion)	Longino, "Values and Objectivity"	<b>Reading response #11</b>	
Week 7 Mon Feb 15	<i>NO CLASS - PRESIDENT'S DAY</i>			Chakravartty, "What You Don't Know Can't..."  Hacking, "Experimentation and Scientific..."  Laudan, "A Confutation of Convergent..."  Worrall, "Structural Realism"
Week 7 Wed Feb 17	Scientific realism (Lecture)	<i>no reading</i>	<b>Short paper #2</b>	
Week 7 Fri Feb 19	The problem of unconceived alternatives (Discussion)	Stanford, "Unconceived alternatives and conservatism in science..."	<b>Reading response #12</b>	
Week 8 Mon Feb 22	Potochnik (Lecture)	Potochnik, <i>Idealization and the Aims of Science</i> , ch. 1	<b>Paper outline + bibliography</b>	Levy, "Idealization and Abstraction..."  Norton, "Approximation and Idealization..."  Weisberg, "Three Kinds of Idealization..."
Week 8 Wed Feb 24	Potochnik (Discussion)	Potochnik, <i>Idealization and the Aims of Science</i> , ch. 2	<b>Self-assessment #3</b>	
Week 8 Fri Feb 26	Potochnik (Discussion)	Potochnik, <i>Idealization and the Aims of Science</i> , ch. 3	<i>no assignments</i>	

<b>Date</b>	<b>Topic</b>	<b>Required Readings</b> (due on date listed)	<b>Assignments</b> (due on date listed)	<b>Optional Readings</b> (by week)
Week 9 Mon Mar 01	Paper workshop	<i>no reading</i>	<b>Paper draft</b>	de Regt, "Scientific Understanding..."
Week 9 Wed Mar 03	Potochnik (Discussion)	Potochnik, <i>Idealization and the Aims of Science</i> , ch. 4	<b>Peer critique</b>	Khalifa, "The Role of Explanation in..."
Week 9 Fri Mar 05	Potochnik (Discussion)	Potochnik, <i>Idealization and the Aims of Science</i> , ch. 5	<b>Final paper due</b> (W-credit students)	Wimsatt, "False Models as a Means to..."
Week 10 Mon Mar 08	Work on paper	<i>no reading</i>	<i>no assignments</i>	Danks, "Safe-and-Substantive Perspectivism"
Week 10 Wed Mar 10	Potochnik (Discussion)	Potochnik, <i>Idealization and the Aims of Science</i> , ch. 6	<b>Final paper due</b>	Mitchell, "Integrative Pluralism"
Week 10 Fri Mar 12	Potochnik (Discussion)	Potochnik, <i>Idealization and the Aims of Science</i> , ch. 7	<b>Revisions due</b> (W-credit)	Ruphy, "Foliated Pluralism"
Week 11	EXAM WEEK	<b>FINAL SELF-ASSESSMENT DUE</b>		