

Philosophy of Science (PHIL 4614/5614)

Professor: Karen Kovaka

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Class Hours: Tues/Thurs 2-3:15pm

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Course Description

Science is central to what we think we know, how we make decisions, and how we understand ourselves. But what makes the difference between what is scientific and what is not? Why is science such a powerful way to gain knowledge? How much should we trust the results of scientific research? Is it ever rational for non-experts to be skeptical about the claims scientists make? We will explore these questions by focusing on four aspects of scientific investigation: the methods scientists use, the behavior of scientists, the place of values in science, and the results of scientific inquiry.

Evaluation

1. Homework: 50% (5 assignments, each 10%)
2. Midterm exam: 15%
3. Final exam: 20%
4. Participation: 15%

Homework

I will ask you to complete 5 homework assignments. They will vary in format. Some assignments will involve argument reconstruction and analysis. Others will be outward-facing, requiring you to explain philosophical ideas to other people. There will also be a personal reflection exercise, and even a short quantitative reasoning problem set. I will walk you through each assignment before it is due so that you know exactly what to expect. Submit these through our Canvas site. The due dates for the assignments are below:

- Assignment 1: 9/3
- Assignment 2: 10/1
- Assignment 3: 10/15
- Assignment 4: 11/5
- Assignment 5: 11/21

Exams

The mid-term will be a short answer, take-home style exam. It will be assigned on 10/15 and due on 10/22. The final will also be a take-home, and I will let undergraduates choose one of several possible exam formats. The final exam will be available on or before the last day of class (12/10) and due on 12/17. Graduate students are required to write an 8-10 page paper for the final exam. They must consult with me about their topic ahead of time.

Course Participation

Active participation in class is one of the single best ways to grow as a thinker and communicator. We learn as much from one another's insights, disagreements, questions, and responses as we do from the course readings. I think of participation very broadly: not only do your comments in class count, so do office hour visits, emails, and making creative connections between the course material and life outside our seminar room. How exactly you participate is mostly up to you, but I do expect each of you to actively contribute to the course.

Fine Print

- **Attendance:** I fully expect you to come to every single class session except when illness or other personal circumstances prevent you. I will keep track of attendance each week and forgive up to 3 absences with no questions asked. After three absences, I will start deducting points from your final grade for each additional absence. If your circumstances require you to miss more than three classes, you and I need to speak in person about alternative ways for you to participate in the course.
- **Accessibility:** We all learn differently, and I am committed to making this course accessible to everyone. Please come talk to me if some aspect of the course isn't working for you: we can collaborate on alternatives that suit your needs, interests, and learning style. If you have a disability (or think you might), it's also a good idea to contact [Services for Students with Disabilities](#).
- **Technology:** Phones, tablets, and laptops often distract us during class. I want to free you from these distractions as much as possible. For that reason, I will provide notes after every class. You will find them on the course Canvas site. This means you don't have to type or write notes yourselves, and it gives you the option of participating in class without any

tech at all. If you do use a laptop or tablet, please do not check your email, message people, or use the Internet for anything that isn't course-related.

- **Academic integrity:** I take academic integrity very seriously. It's important that all the assignments you complete are your own work and that you know how to credit and cite sources appropriately. If you have any questions about my expectations for a particular assignment, be sure to talk to me!

The Undergraduate Honor Code pledge that each member of the university community agrees to abide by states: "As a Hokie, I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do." Students enrolled in this course are responsible for abiding by the Honor Code. A student who has doubts about how the Honor Code applies to any assignment is responsible for obtaining specific guidance from the course instructor before submitting the assignment for evaluation. Ignorance of the rules does not exclude any member of the University community from the requirements and expectations of the Honor Code. For additional information about the Honor Code, please visit: <https://www.honorsystem.vt.edu/>.

- **Changes to the syllabus:** I may adjust the course readings and schedule as the semester goes along. It is your responsibility to pay attention to Canvas and your email so that you are aware of any changes.

Texts

There are three required books for this course:

- *Philosophy of Science: A New Introduction*, by Philip Kitcher and Gillian Barker
- *Science, Policy, and the Value-Free Ideal*, by Heather Douglas
- *Measuring the World*, by Daniel Kehlmann

The rest of the readings are available on our Canvas site.

Reading Schedule

1 Introduction

Date	Content
Tues. 8/27	<ul style="list-style-type: none"> • Topic: Getting Philosophical About Science • Reading: <i>Philosophy of Science: A New Introduction</i>, ch 1
Thurs. 8/29	<ul style="list-style-type: none"> • Topic: Some History • Reading: <i>Philosophy of Science: A New Introduction</i>, ch 2

2 Scientific Methods

Date	Content
Tues. 9/3	<ul style="list-style-type: none"> • Topic: The Diversity of the Sciences • Reading: <i>Philosophy of Science: A New Introduction</i>, ch 3
Thurs. 9/5	<ul style="list-style-type: none"> • Topic: Experiments • Reading: Angela Potochnik, Matteo Colombo, and Cory Wright (2019), <i>Recipes for Science</i>, ch 2
Tues. 9/10	<ul style="list-style-type: none"> • Topic: Models • Reading: Angela Potochnik, Matteo Colombo, and Cory Wright (2019), <i>Recipes for Science</i>, ch 3
Thurs. 9/12	<ul style="list-style-type: none"> • Topic: Comparing Methods • Reading: Reading: Emily Parke (2014), "Experiments, simulations, and epistemic privilege"
Tues. 9/17	<ul style="list-style-type: none"> • Topic: The Problem of Induction • Reading: Hume (1738), <i>A Treatise of Human Nature</i>, 1.3.12
Thurs. 9/19	<ul style="list-style-type: none"> • Topic: Paradoxes of Confirmation • Reading: Nelson Goodman (1979), <i>Fact, Fiction, and Forecast</i>, ch 3
Tues. 9/24	<ul style="list-style-type: none"> • Topic: Bayesian Confirmation Theory • Reading: Kenny Easwaran (2011), "Bayesianism II: Applications and Criticisms" • Reading: Michael Strevens (2017) "Notes on Bayesian Confirmation Theory" (optional)

3 Behavior of Scientists

Date	Content
Thurs. 9/26	<ul style="list-style-type: none"> • Topic: Scientists as Characters I • Reading: Daniel Kehlmann, <i>Measuring the World</i>
Tues. 10/1	<ul style="list-style-type: none"> • Topic: Scientists as Characters II • Reading: Daniel Kehlmann, <i>Measuring the World</i>
Thurs. 10/3	<ul style="list-style-type: none"> • Topic: Normal Science • Reading: Reading: Thomas Kuhn (1962), <i>The Structure of Scientific Revolutions</i>
Tues. 10/6	<ul style="list-style-type: none"> • Topic: Revolutionary Science • Reading: Thomas Kuhn (1962), <i>The Structure of Scientific Revolutions</i>
Thurs. 10/10	<ul style="list-style-type: none"> • Topic: Responses to Kuhn • <i>Philosophy of Science: A New Introduction</i>, ch 4
Tues. 10/15	<ul style="list-style-type: none"> • Topic: Sociology and Social Structure I • Reading: <i>Philosophy of Science: A New Introduction</i>, ch 5
Thurs. 10/17	<ul style="list-style-type: none"> • Topic: Sociology and Social Structure II • Reading: Miriam Solomon (1994), "Social empiricism"

4 Values and Science

Date	Content
Tues. 10/22	<ul style="list-style-type: none"> • Topic: Politics and Science • Reading: <i>Philosophy of Science: A New Introduction</i>, ch. 6
Thurs. 10/24	<ul style="list-style-type: none"> • Topic: Objectivity • Reading: Helen Longino (1990), "Values and objectivity"
Tues. 10/29	<ul style="list-style-type: none"> • Topic: The Value-Free Ideal • Reading: Heather Douglas (2009), <i>Science, Policy, and the Value-Free Ideal</i>
Thurs. 10/31	<ul style="list-style-type: none"> • Topic: Responsible Science • Reading: Heather Douglas (2009), <i>Science, Policy, and the Value-Free Ideal</i>
Tues. 11/5	<ul style="list-style-type: none"> • Topic: Science and Policy • Reading: Heather Douglas (2009), <i>Science, Policy, and the Value-Free Ideal</i>
Thurs. 11/7	<ul style="list-style-type: none"> • Topic: A Defense of the Value-Free Ideal • Reading: Liam Bright (2018), "Dubois' Democratic Defence of the Value Free Ideal"
Tues. 11/12	<ul style="list-style-type: none"> • Topic: Indigenous Knowledges • Reading: Robin Wall Kimmerer (2013), <i>Braiding Sweetgrass</i>

5 Results of Scientific Enquiry

Date	Content
Thurs. 11/14	<ul style="list-style-type: none"> • Topic: Scientific Realism I • Reading: Anjan Chakravartty (2007), <i>A Metaphysics for Scientific Realism</i>, ch 1
Tues. 11/19	<ul style="list-style-type: none"> • Topic: Scientific Realism II • Reading: Anjan Chakravartty (2007), <i>A Metaphysics for Scientific Realism</i>, ch 2
Thurs. 11/21	<ul style="list-style-type: none"> • Topic: Scientific Realism III • Anjan Chakravartty (2007), <i>A Metaphysics for Scientific Realism</i>, ch 3
Tues. 12/3	<ul style="list-style-type: none"> • Topic: Underdetermination and Unconceived Alternatives I • Reading: Kyle Stanford (2009), <i>Exceeding Our Grasp</i>, ch 1
Thurs. 12/5	<ul style="list-style-type: none"> • Topic: Underdetermination and Unconceived Alternatives II • Reading: Kyle Stanford (2009), <i>Exceeding Our Grasp</i>, ch 2

6 Conclusion

Date	Content
Tues. 12/10	<ul style="list-style-type: none"> • Topic: Review • Reading: none