

PHIL 2650: INTRODUCTION TO THE PHILOSOPHY OF SCIENCE

Spring 2025
The Ohio State University

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Office Hours	Tuesdays 1-3PM and by appt.
Class Time	TuTh 9:35 - 10:55AM
Class Location	Lazenby Hall 001

Description Welcome! I'm very excited to do some philosophy with you all!

This course is an introduction to the philosophy of science. Philosophy of science has been around as long as philosophy and science have been around. We'll learn a little bit about the rich history of philosophy of science in this course. But our primary focus will be to introduce ourselves to the issues and debates within contemporary philosophy of science.

To that end, we will begin with what philosophers call the "puzzle of induction," before moving on to consider the question: "what is science?" This question of what science *is* is called the "demarcation problem" since answers to it propose to separate science from other things (like pseudoscience or non-scientific forms of inquiry). We'll then discuss scientific revolutions before turning to the famous debate between scientific realists and scientific anti-realists. This debate concerns whether we should believe that our best scientific theories are true (or close to true), or instead think those theories are just useful tools. We'll then think about the values people use in science, including the political and social values that influence science. We'll finish the course by discussing these questions: (i) can all the sciences can be unified with physics "at the bottom"? (ii) what makes for a good explanation? (iii) what is a law of nature? and (iv) why is mathematics so effective in science?

By the end of this course, students should be able to critically think, question, discuss, and write about the nature and methods of science.

General Education Information The Curriculum Committee of the College of Arts & Sciences requests that syllabi of all GE courses list the goals and learning objectives for the relevant category of the GEC.

The goals of the *Number, Nature, and Mind GE Theme* are:

1. Successful students will analyze the nature of mathematics and/or mathematical reasoning at a more advanced and in-depth level than in the Foundations component.
2. Successful students will integrate approaches to number, nature, and mind by making connections to their own experience of mathematical thinking and its application in the world, and by making connections to work they have done in previous classes and/or anticipate doing in the future.

3. Successful students will experience and examine mathematics as an abstract formal system accessible to mental manipulation and/or mathematics as a tool for describing and understanding the natural world.

Expected Learning Outcomes: Successful students are able to...

- Engage in critical and logical thinking about the nature and/or application of mathematical reasoning.
- Engage in an advanced, in-depth, scholarly exploration of the philosophical and/or cognitive foundations of mathematics and/or the application of mathematics in understanding the natural world.
- Identify, describe, and synthesize approaches to or experiences of the role of mathematics and mathematical reasoning in different academic and non-academic contexts.
- Demonstrate a developing sense of self as a learner through reflection, self-assessment, and creative work, building on prior experiences to respond to new and challenging contexts.
- Analyze and describe how mathematics functions as an idealized system that enables logical proof and/or as a tool for describing and understanding the natural world.

Class Conduct This class will be heavily discussion based. And we will sometimes discuss very sensitive political, moral, and religious topics. So even if we disagree with someone else, we must voice that disagreement in a respectful manner and treat all the members of class with human dignity. If we want to, as a class, we may develop a list of conversational ground rules for our discussions. Do not use cellphones once class starts and please do not email, Internet shop, or social media scroll during class.

Carmen All course content such as announcements, slides, assignments, grades and required readings will be made available on Carmen. You are expected to do the readings *before* the class for which the reading is assigned. Check Carmen regularly. What is assigned on Carmen takes precedence over the assignments/readings detailed on the syllabus.

Please **contact me via email, *instead*** of via the Carmen messaging.

Materials There is no required textbook for this class. All of the assigned reading material will be available for free on Carmen.

Requirements and Grading Your overall course grade will be assigned based on the following components (with the corresponding percentage of overall grade for the assignment given in parenthesis):

- Participation and attendance (20%).
- Carmen discussions (10%).
- Initial reflection paper (5%).
- Midterm exam (25%).
- Final paper draft (10%).
- Final paper (25%).

- Final reflection (5%).

Detailed assignment sheets for the papers will be distributed closer to the time of assignment, though some minimal detail for each portion of your grade can be found in the next section of this syllabus. Tentative due dates will be given below. The only opportunity for extra credit in this class will be a small one at the very end of the course.

Descriptions of Major Course Assignments

There will be two **reflection papers**, one at the beginning of the semester and one at the end. Your initial reflection paper will be a very short paper in which you describe your personal philosophical beliefs regarding some of the topics of our class. I expect you to offer some reasoning for the beliefs you hold, but not much reasoning as we will have only just begun our introduction at this point in the semester. You will compare this paper with your final reflection paper at the course's end so that you can see how much you have grown as a philosopher. These will be short, low-stakes assignments.

The **midterm exam** will be a cumulative exam on the various concepts we've learned over the semester. It will consist of multiple question types: multiple choice, true or false, fill in the blank, and short essay. More detail will follow as we approach the midterm.

The **Carmen discussion posts** will be discussion board posts on our Carmen page. I will open 10 discussion boards throughout the semester with an open discussion question related to that week's topics. You do not have to post all 10 weeks. But you do have to post at least 6 weeks. When you post, for full credit, you must post your initial answer to the discussion board question prompt, *and then also* respond to one of your classmate's posts. Your response must be substantial.

The **final paper** will be done in two parts. First you will submit a draft of your final paper to me a few weeks before the final paper is due. I will grade this draft and give you substantive feedback for you to revise your paper before submitting the final version. This way you can practice your writing in a lower-stakes context first, before moving on to submitting the higher value final submission. You will get detailed assignment sheets for this assignment.

Participation and attendance. Please read the assigned reading material *before* class for the day that it was assigned. Everyone is expected to participate in the class in some capacity, whether it be in small group discussion, by asking questions, or by participating in whole-class discussions. A note will be made of participation in lectures, and your participation grade will rise the more one conscientiously participates. A conscientious participant is one who makes respectful contributions to the discussion, not one who tries to dominate it or change the subject. Conscientious participation also requires being familiar with the material before class begins. As for attendance, it will be recorded and kept up with via exit cards. Most class periods, I will distribute index cards where you are to write a question or comment that you had about the material for the day. Make sure to write your full name on them legibly as they will serve as the way I take attendance during lectures. You are allowed up to **four** absences, no questions asked. That is, you can miss four lectures, for any reason whatsoever, with no penalty to you. Starting with the fifth day missed, however, a point will be dropped from your participation and attendance grade for every further day missed. This means, for example, if you miss six lectures, the **maximum** participation and attendance grade you will be able to receive will be an 18 out of 20. Of course this attendance policy is up to negotiation on a one-on-one level if you are suffering from a more severe illness, facing some serious life event during the semester, or are a student-athlete with the University-approved travel documentation. If any of this applies to you or if you have any questions about the attendance policy (or any other grading policy), please just come see me or email me. I'm happy to discuss things with

any of you.

Late Assignments Extensions will only be granted in extraordinary circumstances (or, of course, if you have an accommodation from SDLS which involves an extension). That being said, please email me ASAP if you need an extension because of some emergency. Late submissions of assignments will lose 5 points per day. No credit will be given after 5 days.

Instructor Feedback and Response Time For every assignment, I will have grades returned to the students within 14 days of submission. If you need to contact me out of class, please email me at dewitt.197@osu.edu directly. I have technical difficulties getting Carmen messages, so if you message me via Carmen do not expect me to receive your message. I will respond to emails within about 24 hours on weekdays and around 48 hours on weekends.

Grading Scale We will use the OSU Standard Grade Scheme:

- 93-100: A
- 90-92.9: A-
- 87-89.9: B+
- 83-86.9: B
- 80-82.9: B-
- 77-79.9: C+
- 73-76.9: C
- 70-72.9: C-
- 67-69.9: D+
- 60-66.9: D
- Below 60: E

Disability Services The University strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability (including mental health, chronic or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

Academic Misconduct Academic misconduct is a serious offense. You are responsible for knowing what counts as academic misconduct. You are also expected not to commit it. In accordance with Faculty Rule 3335-5-487, all suspected cases of academic misconduct will be reported to the university's Committee on Academic Misconduct who will then be responsible for investigating or establishing procedures for the investigation of all reported cases of student academic misconduct. The term "academic misconduct" includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and

dishonest practices in connection with examinations. For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

Do not use ChatGPT or similar software for your discussion posts or your papers.

Religious Accommodations It is Ohio State's policy to reasonably accommodate the sincerely held religious beliefs and practices of all students. The policy permits a student to be absent for up to three days each academic semester for reasons of faith or religious or spiritual belief.

Students planning to use religious beliefs or practices accommodations for course requirements must inform the instructor in writing no later than 14 days after the course begins. The instructor is then responsible for scheduling an alternative time and date for the course requirement, which may be before or after the original time and date of the course requirement. These alternative accommodations will remain confidential. It is the student's responsibility to ensure that all course assignments are completed.

Commitment to a diverse and inclusive learning environment The Ohio State University arms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

Your Mental Health As a student you may experience a range of issues that can cause barriers to learn, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. No matter where you are engaged in distance learning, The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you find yourself feeling isolated, anxious or overwhelmed, on-demand resources are available at go.osu.edu/ccsondemand. You can reach an on-call counselor when CCS is closed at 614-292-5766, and 24-hour emergency help is also available through the 24/7 National Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org. The Ohio State Wellness app is also a great resource available at go.osu.edu/wellnessapp.

Tentative Course Schedule

The schedule below is tentative. Any unexpected changes to the schedule will be announced on Carmen as the course proceeds.

Week One

January 7th Introduction
 Read the Syllabus
 January 9th Introduction
 Read the introduction to Dear's *The Intelligibility of Nature*.

Week Two

January 14th Induction

Read “Induction and inductivism” by Ladyman.

January 16thInduction

Read pgs. 31-40 of Ladyman’s “The problem of induction and inductivism.”

Week Three

January 21stInduction

Read pgs. 40-61 of Ladyman’s “The problem of induction and inductivism.”

January 23rd Demarcation & Falsification

Read pgs. 57-63 of Godfrey-Smith’s “Popper: Conjecture & Refutation.”

Week Four

January 28th Demarcation & Falsification

Read pgs. 63-74 of Godfrey-Smith’s “Popper: Conjecture & Refutation.”

January 30th Kuhn & Scientific Revolutions

Read “Kuhn and Normal Science” by Godfrey-Smith.

Week Five

February 4th Kuhn & Scientific Revolutions

Read “Kuhn and Revolutions” by Godfrey-Smith.

February 6th The Revolutions of Physics

Watch “The Scientific Revolution” and “Einstein’s Revolution” by CrashCourse.

Week Six

February 11thScientific Realism

Read pgs. 129-146 of Ladyman’s “Scientific Realism.”

February 13thScientific Realism

Read pgs. 146-160 of Ladyman’s “Scientific Realism.”

Week Seven

February 18thScientific Realism

Read pgs. 1-8 of Chakravartty’s “Scientific Realism.”

February 20thScientific Realism

Read pgs. 9-15 of Chakravartty’s “Scientific Realism.”

Week Eight

February 25th Midterm Week

Catch-up and review day.

February 27th Midterm Week

Midterm exam in class.

Week Nine

March 4thObjectivity and Science as Social

Read “The Challenge from Sociology of Science” by Godfrey-Smith.

March 6thObjectivity and Science as Social

Read “Values and Objectivity” pgs. 170-180 by Longino.

Week Ten

NO CLASS SPRING BREAK!

Week Eleven

March 18th Objectivity and Science as Social
 Read “Feminist Philosophy of Science: Values and Objectivity” by Crasnow.
 March 20th Explanation
 Read “Explanation” by Godfrey-Smith.

Week Twelve

March 25th Unity of Science
 Read pgs. 1-10 of “The Unity of Science” by Cat.
 March 27th Unity of Science
 Read pgs. 22-26 of “The Unity of Science” by Cat.

Week Thirteen

April 1st Laws of Nature
 Read “Laws of Nature” by Zerella and pgs. 1-7 of “Laws of Nature” by Carroll.
 April 3rd Laws of Nature
 Read “Do the Laws of Physics State the Facts” by Cartwright.

Week Fourteen

April 8th Mathematics in the Sciences
 Read “The Unreasonable Effectiveness of Mathematics in the Natural Sciences” by Wigner.
 April 10th Mathematics in the Sciences
 Read pgs. 1-13 of Marcus’s “The Indispensability Argument in the Philosophy of Mathematics.”

Week Fifteen

April 15th Mathematics in the Sciences
 No new reading.
 April 17th Final Day
 No new reading.

Important Assignment Dates (Also Tentative!)

Initial reflection paper January 19th at 11:59pm
 Midterm February 27th in class
 Final paper DRAFT April 6th at 11:59pm
 Final paper April 23rd at 11:59pm
 Final reflection April 27th at 11:59pm