

PHIL 3253 – Science, Knowledge, and Values

Dr. Trevor Pearce — trevorpearce@charlotte.edu

Spring 2025 — MWF 11:15am–12:05pm — Denny 202

Office Hours

By appointment in Winningham 103C (or on Zoom)

Description

What is science, anyway? Is there a scientific method? Do values have a place in science? In this course we will deal with these questions and more. Topics include distinguishing science from other forms of inquiry, how scientists model and explain phenomena, how new scientific theories emerge, debates over the role of values in scientific research, and finally reasons why we might trust or mistrust science.

Required Texts

Thomas Kuhn. *The Structure of Scientific Revolutions*. 4th ed. Chicago: University of Chicago Press, 2012.

All other texts will be available as PDFs on Canvas.

Evaluation of Students

- 25% Question / Passage / Pattern — every class
- 25% Midterm Assignment — February 16 & 23
- 25% Presentation — April 21–30
- 25% Final Exam — May 2

Question / Passage / Pattern (QPP): You must read each assigned reading by the day it is due. Each day, in the first five minutes of class, you will complete a brief handwritten assignment in which you discuss a question, a passage, or a pattern. Take out a piece of paper. At the top of the page, write ‘question,’ ‘passage,’ or ‘pattern.’ Then, depending on which you have picked, follow these instructions:

Question Pose a question related to the reading. It should be a genuine question, i.e., one you really want to know the answer to. Then make a good faith attempt to answer the question.

Passage Reproduce a specific passage that resonated with you and give a short explanation of why it resonated with you.

Pattern Identify a pattern, either within the reading or between this reading and an earlier one, along with a short explanation of what that pattern tells you about the reading—or about the larger concept, if you are connecting it to earlier readings.

You may use books and notes when doing these assignments but they must be written in class and you must include the relevant page or section numbers from the reading. If you arrive late, you must still hand in your QPP assignment at the same time as everyone else. QPP assignments will not be accepted over email; absence from class is not a valid excuse for not turning in your QPP assignment.

A few unplanned absences are to be expected, so your lowest three QPP grades will be automatically dropped. Requests for any additional excused absences due to illness, medical emergencies, personal or family emergencies, military orders, or court orders should be submitted as an absence verification request online at [Student Assistance and Support Services](#).

The midterm assignment is a take-home assignment that you will submit via Canvas. Your tasks will be as follows:

1. Identify by name and topic a science class that you have taken or are taking here at UNC Charlotte. This can be either a natural sciences or a social sciences class, including any Gen Ed section of 1501 or 1511.
2. Come up with a question related to the **specific topic** of that class that science—at least on its own—is not equipped to answer.

3. Explain why science is not equipped to answer the question. [200–250 words]
4. Attempt to answer the question. [200–250 words]

#1 and #2 must be submitted by February 16 at 11:59pm on Canvas. I may suggest some modifications to your question at this point. The complete assignment including #3 and #4 must be submitted by February 23 at 11:59pm on Canvas.

For the end-of-semester presentation, students will work in pairs. Each pair will find a news story relating to science and spend 5 minutes presenting it to the class. They will spend the next 5–10 minutes leading the class in a discussion of the story, in light of what we have learned during the semester. These presentations will be held during the last four sessions of the semester. Students should clear their chosen news story with me at least a week before their presentation date.

The final exam is optional, but if you skip the final exam the highest grade you can receive is a ‘B.’ The exam will be an essay written entirely during the scheduled final exam session on Friday, May 2 from 11:00am–1:30pm. Essay questions will be pre-circulated; students will select only one of the questions. The exam is closed book but students can bring in one 3 x 5 inch handwritten notecard.

Class Policies

The standards and requirements set forth in this syllabus may be modified at any time by the course instructor. Notice of such changes will be either by Canvas announcement or by email.

I will conduct this class in an atmosphere of mutual respect. I encourage your active participation in class discussions. Each of us may have strongly differing opinions on the various topics of class discussions. The conflict of ideas is encouraged and welcome. The orderly questioning of the ideas of others, including mine, is similarly welcome. However, I will exercise my responsibility to manage the discussions so that ideas and argument can proceed in an orderly fashion. You should expect that if your conduct during class discussions seriously disrupts the atmosphere of mutual respect I expect in this class, you will not be permitted to participate further.

All students and the instructor are expected to engage with each other respectfully. Unwelcome conduct directed toward another person based upon that person’s actual or perceived race; color; religion (belief and non-belief); sex; sexual orientation;

gender identity; age; national origin; physical or mental disability; veteran status; genetic information; or for any other reason, may constitute a violation of [University Policy 501](#). Any student suspected of engaging in such conduct will be referred to the [Office of Civil Rights and Title IX](#).

UNC Charlotte is committed to providing a respectful, safe, and inclusive environment for community members that is free from discrimination, discriminatory harassment, and interpersonal violence. Please be aware that all UNC Charlotte employees, including faculty members, are expected to relay any information or reports of discrimination, discriminatory harassment, or sexual and interpersonal misconduct they receive. This means that if you tell me about a situation involving these matters, I am legally obligated to report the information to the [Office of Civil Rights and Title IX](#). If you wish to speak to someone confidentially, there are several on-campus resources that are not subject to this mandatory reporting requirement, e.g., the [Center for Counseling and Psychological Services](#).

This course affirms people of all gender expressions and gender identities. If you prefer to be called a different name than what is indicated on the class roster, please let me know. Feel free to correct me on your preferred gender pronoun. If you have any questions or concerns, please do not hesitate to contact me.

If a religious accommodation is needed, students should communicate directly with me regarding the related need. The request should be made in writing and should state (i) the specific accommodation being requested, (ii) the religious practice or belief the student holds, (iii) how the requested accommodation enables the student to participate in their religious practice or belief, and (iv) the date(s) and/or frequency of the requested accommodation. The request should be submitted as far in advance as possible. [University Policy 409](#) provides more details about this procedure.

Students in this course seeking accommodations to disabilities must first consult with the [Office of Disability Services](#) and follow the instructions of that office for obtaining accommodations.

Finally, all students are required to read and abide by the [Code of Student Academic Integrity](#). Violations of the Code, including plagiarism, will result in disciplinary action as provided in the Code. Definitions and examples of plagiarism are set forth in the Code and on the [Student Accountability & Conflict Resolution](#) website.

Class Schedule

Science and Its Aims

- Jan 13** Introduction — no reading
- Jan 15** Karl Popper, “Philosophy of Science: A Personal Report,” in *British Philosophy in the Mid-Century*, edited by C. A. Mace (George Allen and Unwin, 1957), 155–163 [excerpted from full chapter]
- Jan 17** Susan Haack, “Six Signs of Scientism,” *Logos & Episteme* 3 (2012): 75–95
- Jan 20** NO CLASS (Martin Luther King Jr. Day)
- Jan 22** John Norton, “A Little Survey of Induction,” in *Scientific Evidence: Philosophical Theories and Applications*, edited by Peter Achinstein (Johns Hopkins University Press, 2005), 9–34
- Jan 24** Peter Godfrey-Smith, “Explanations, Laws, and Causes,” in *Theory and Reality: An Introduction to the Philosophy of Science*, 2nd ed. (University of Chicago Press, 2021), 246–265
- Jan 27** Heather Douglas, “The Irreducible Complexity of Objectivity,” *Synthese* 138 (February 2004): 453–473
- Jan 29** Helen Longino, “Foregrounding the Background,” *Philosophy of Science* 83 (December 2016): 647–661
- Jan 31** Angela Potochnik, “The Diverse Aims of Science,” *Studies in History and Philosophy of Science* 53 (October 2015): 71–80

Scientific Methods

- Feb 3** Carol Cleland, “Methodological and Epistemic Differences between Historical Science and Experimental Science,” *Philosophy of Science* 69 (September 2002): 474–496
- Feb 5** Adrian Currie, “Narratives, Mechanisms and Progress in Historical Science,” *Synthese* 191 (2014): 1163–1183

- Feb 7** Emily Parke, “Experiments, Simulations, and Epistemic Privilege,” *Philosophy of Science* 81 (October 2014): 516–536
- Feb 10** Michael Weisberg, “Who is a Modeler?” *British Journal for the Philosophy of Science* 58 (June 2007): 207–233
- Feb 12** Michela Massimi, “Two Kinds of Exploratory Models,” *Philosophy of Science* 86 (December 2019): 869–881
- Feb 14** Wendy Parker, “Model Evaluation,” in *The Routledge Handbook of Philosophy of Scientific Modeling*, edited by Tarja Knuuttila, Natalia Carrillo, and Rami Koskinen (Routledge, 2024), 208–219

Scientific Change

- Feb 17** Thomas Kuhn, *The Structure of Scientific Revolutions* (University of Chicago Press, 1962), Chapters 2 & 4
- Feb 19** Thomas Kuhn, *The Structure of Scientific Revolutions* (University of Chicago Press, 1962), Chapter 8
- Feb 21** Thomas Kuhn, *The Structure of Scientific Revolutions* (University of Chicago Press, 1962), Chapters 9
- Feb 24** Thomas Kuhn, *The Structure of Scientific Revolutions* (University of Chicago Press, 1962), Chapter 10
- Feb 26** Thomas Kuhn, *The Structure of Scientific Revolutions* (University of Chicago Press, 1962), Chapters 11–12
- Feb 28** Thomas Kuhn, *The Structure of Scientific Revolutions* (University of Chicago Press, 1962), Chapter 13

Values in Science

- Mar 10** Helen Longino, “Beyond ‘Bad Science’: Reflections on the Value Freedom of Scientific Inquiry,” *Science, Technology, & Human Values* 8 (January 1983): 7–17

- Mar 12** Heather Douglas, “Inductive Risk and Values in Science,” *Philosophy of Science* 67 (December 2000): 559-579
- Mar 14** NO CLASS (professor away at conference)
- Mar 17** Joyce Havstad, “Sensational Science, Archaic Hominin Genetics, and Amplified Inductive Risk,” *Canadian Journal of Philosophy* 52 (April 2022): 295–320
- Mar 19** Bennett Holman and Torsten Wilholt, “The New Demarcation Problem,” *Studies in History and Philosophy of Science* 91 (February 2022): 211–220
- Mar 21** Heather Douglas and T. Y. Branch, “The Social Contract for Science and the Value-Free Ideal,” *Synthese* 203 (2024): no. 40.

Science and Public Trust

- Mar 24** Kyle Powys Whyte and Robert P. Crease, “Trust, Expertise, and the Philosophy of Science,” *Synthese* 177 (December 2010): 411–425
- Mar 26** Naomi Oreskes, “The Fact of Uncertainty, the Uncertainty of Facts and the Cultural Resonance of Doubt,” *Philosophical Transactions of the Royal Society A* 373 (November 28, 2015): no. 20140455
- Mar 28** Maya Goldenberg, “Public Misunderstanding of Science? Reframing the Problem of Vaccine Hesitancy,” *Perspectives on Science* 24 (September–October 2016): 552–581
- Mar 31** Eric Turkheimer, *Understanding the Nature–Nurture Debate*, Chapters 5 & 7
- Apr 2** Adam Hochman, “Racial Classification Without Race: Edwards’ Fallacy,” in *Remapping Race in a Global Context*, edited by Ludovica Lorusso and Rasmus Grønfeldt Winther (Routledge, 2022), 74–91
- Apr 4** NO CLASS (Refresh Weekend)
- Apr 7** Nancy Cartwright and Jeremy Hardie, *Evidence-Based Policy: A Practical Guide to Doing It Better* (Oxford University Press, 2012), 3–7, 49–58,

122–134 [scanned excerpts]

- Apr 9** Felipe Romero, “Philosophy of Science and the Replicability Crisis,” *Philosophy Compass* 14 (November 2019)
- Apr 11** Kathleen Creel, “Transparency in Complex Computational Systems,” *Philosophy of Science* 87 (October 2020): 568–589
- Apr 14** Emily Sullivan, “Understanding from Machine Learning Models,” *British Journal for the Philosophy of Science* 73 (March 2022): 109–133
- Apr 16** Emily Sullivan, “Inductive Risk, Understanding, and Opaque Machine Learning Models,” *Philosophy of Science* 89 (December 2022): 1065–1074
- Apr 18** NO CLASS (Easter / Passover)

Student Presentations

- Apr 21** Student presentations
- Apr 23** Student presentations
- Apr 25** NO CLASS (professor attending conference)
- Apr 28** Student presentations
- Apr 30** Student presentations