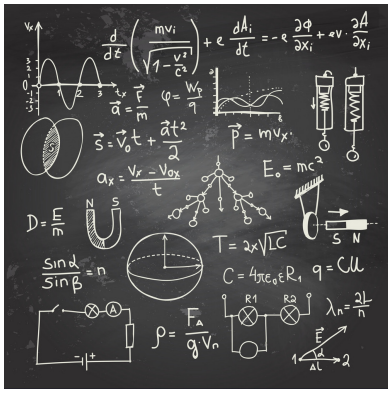
Philosophy of Science

Philosophy 315
TTh 1:50–3:20pm; W 11:30am–12:30pm
Howard 243

Fall 2023



My Information

Here is my information:

Dr. Jay Odenbaugh
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Howard 230
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Office hours: 1130am–1pm or by Zoom
Zoom: https://zoom.us/j/6081570530

Introduction

This course examines various epistemological, metaphysical, and ethical issues in the natural and social sciences. Specifically, we examine the following questions:

- What is science? What is *the* scientific method? Does it have a method?
- How does science change through time – is it rational, irrational, or something else?
- Can inductive inference be justified (i.e., must the future resemble the past)?
- What is a scientific explanation? How can science tell us *why* things happen?
- Are there laws of nature?
- Is everything reducible to physics?
- Should we believe in things we cannot see like genes, quarks, and magnetic fields? What evidence could there be for their existence if we cannot observe them?
- What role (if any) should ethical, social, and political values play in science? Can they be avoided?
- How is science being commodified and how can this be problematic?

Course Materials

All materials will be electronically distributed on Google Classroom.

Class Structure

Generally speaking, we will have two readings per week. Readings for each class will be between 10 – 20 pages. Our daily class will involve lecture and discussion and potentially small group activities.

Course Requirements

In this course, your grade will consist in three exams (papers), homework, and participation. Your final grade is determined as follows:

- Three exams (or papers) ($3 \times 20\% = 60\%$)
- Homework (30%)
- Participation (10%)

Exams & Papers

You will write exams or papers for this course. On each exam, you will answer four questions. Your answers should be no more one page per question. Before our first exam, I will explain what I am looking for along with my grading rubric. If you prefer, you can write a short ($\approx$4 pages) paper instead of an exam. Note, I will accept any combination of exams/papers. Before our first exam or paper, I will explain what I am looking for along with my grading rubric and ditto for papers.

Homework

Each week I will give you two questions (one per reading). You will answer these questions by the assigned date. Late answers receive no credit.

Participation

Unless you have COVID-19 or otherwise excused absence, you should be in class. You are allowed four absences without an excuse with no penalty. If you have COVID-19 symptoms, send me an email before class, and your absence will be excused. For participation, I expect you to be prepared each day, which includes doing the reading, completing the homework, and contributing to class discussions.

Grade Scale

The course grading scale is as follows:

A = 93 – 100, A- = 90 – 92, B+ = 86 – 89, B = 83 – 85, B- = 80 – 82, C+ = 76 – 79, C = 73 – 75, C- = 70 – 72, D+ = 66 – 69, D = 60 – 65, F = 0 – 59

Late Work

All assignments are due on the scheduled dates. However, if you are unable to complete an assignment and you let me know at least one fully day in advance, you may have an extension. Otherwise, for each day an assignment is late, it is reduced one letter grade. Your Google Classroom questions and final exam are excluded from this policy.

ChatGPT

We all use technology for writing which includes autocorrect, spell and grammar checks, tutors, proofreaders, etc. ChatGPT is another such technologies. However, current versions of ChatGPT have limitations.

Errors AI generators make mistakes. Assume the output is incorrect unless you doublecheck them with reliable sources.

Bias Their output may reflect bias because the data they are trained on may reflect bias or be unrepresentative.

Citation These tools use existing sources without citation. They also make up citations.

Environmental impact Each ChatGPT search uses non-trivial amounts of electricity and water. According to estimates, ChatGPT emits 8.4 tons of carbon dioxide per year, more than twice the amount that is emitted by an individual, which is 4 tons per year.

If you decide to use ChatGPT on an assignment, you must cite how it was used. For example, citations may include you used it to generate ideas, turns of phrase, elements of text, long stretches of text, lines of argument, pieces of evidence, maps of the conceptual territory, illustrations of key concepts, etc. If you use chatGPT without citation, then I will treat it as an uncited source, which could be plagiarism.

Academic Integrity

I expect you to understand and abide by the College's Academic Integrity Policy and Procedures. If you have any questions about

the policy, I encourage you to come and talk with me. Failure to cite sources on written assignments is plagiarism, for which students have been dismissed from LC. If you have doubts about how to make proper citations, ask me or consult the writing center.

Learning Differences

If you have been diagnosed with a learning difference and are seeking an accommodation, please provide me, as soon as possible, with a "Notice of Disability and Statement of Accommodation" from Student Support Services.

Schedule

Here is our schedule which is of course revisable (and probably will be revised). I have also added optional readings, which you might use when you write your papers or if you want to explore issues in more detail.

Optional additional readings

Week 1 What is Science (9/6–9/8)

- Syllabus discussion
- Karl Popper, "Science: Conjectures and Refutations"

Popper Selections, edited by David Miller

Week 2 Scientific Progress (9/11–9/15)

- Imre Lakatos, "Science and Pseudoscience"
- Thomas Kuhn, "The Nature and Necessity of Scientific Revolutions"

Criticism & the Growth of Science Knowledge, edited by Imre Lakatos and Alan Musgrave; *The Structure of Scientific Revolutions*, by Thomas Kuhn

Week 3 Scientific Progress (9/18–9/22)

- Thomas Kuhn, "Objectivity, Value Judgment, and Theory Choice"
- Paul Feyerabend, "How to Defend Society from Science"

The Essential Tension by Thomas Kuhn; *Against Method*, by Paul Feyerbend; *How to Defend Society from Science*, by Paul Feyerabend

Week 4 Confirmation (9/25–9/29)

- Nelson Goodman, "The New Riddle of Induction"
- Michael Strevens, "The Bayesian Approach to the Philosophy of Science"

Foundations of Scientific Inference, by Wesley Salmon' *Fact, Fiction, and Forecast*, by Nelson Goodman; *Notes on Bayesian Confirmation Theory*, Michael Strevens

Week 5 Explanation (9/26–10/2)

- Carl Hempel, "Two Basic Types of Scientific Explanation"
- FIRST EXAM/PAPER

Aspects of Scientific Explanation, Carl Hempel; *Making Things Happen: A Theory of Causal Explanation*, James Woodward

Week 6 Laws of Nature (10/9–10/13)

- Nancy Cartwright, "Do the Laws of Physics State Facts?"
- Nancy Cartwright, "Fundamentalism vs. the Patchwork Theory of Laws" FALL BREAK 10/13 – 10/15

How the Laws of Physics Lie, Nancy Cartwright; *The Dappled World*, Nancy Cartwright

Week 7 Reductionism (10/16–10/20)

- Jerry Fodor, "Species Sciences"
- Jaegwon Kim, "Multiple Realization and the Metaphysics of Reduction"

Representations: Philosophical Essays on the Foundations of Cognitive Science; *Supervenience and Mind: Philosophical Essays*, Jaegwon Kim

Week 8 Anti-realism (10/23–10/27)

- Bas van Fraassen, "Arguments Concerning Scientific Realism"
- Larry Laudan, "A Confutation of Convergent Realism"

The Scientific Image, Bas van Fraassen; *Science and Values: The Aims of Science and their Role in Scientific Debate*, Larry Laudan

Week 9 Science & Values (10/30–11/3)

- Richard Rudner, "The Scientist Qua Scientist Makes Value Judgments";
- Richard Jeffreys, "Valuation and acceptance of scientific hypotheses"

Probability and the Art of Judgment, Richard Jeffreys; *An Introduction to Probability and Inductive Logic*, Ian Hacking

Week 10 Science & Values (11/6–11/10)

- Longino, "Values and Objectivity"
- SECOND EXAM/PAPER

Science as Social Knowledge, Helen Longino

Week 11 Science & Values (11/13–11/17)

- Douglas, "Inductive Risk and Values in Science";
- Betz, "In Defence of the Value Free Ideal"

Science, Policy, and the Value-Free Ideal, Heather Douglas; *Current Controversies in Values and Science*, Kevin Elliott and Daniel Steel

Week 12 Science & Values (11/20–11/26)

Value in Ethics and Economics, Elizabeth Anderson

- Anderson, "Uses of Value Judgments in Science: A General Argument, with Lessons from a Case Study of Feminist Research on Divorce"
- THANKSGIVING BREAK 11/23 – 11/26

Week 13 Science & Values (11/27–12/1)

"The Conservation of Races," W. E. B. Du Bois; "Causally Interpreting Intersectionality Theory," Liam Kofi Bright, Daniel Malinsky, and Morgan Thompson

- Kathleen Okruhlik, "Gender and the Biological Sciences"
- Bright, "Du Bois' democratic defence of the value free ideal"

Week 14 Science & Values (12/4–12/8)

The Commodification of Academic Research edited by Hans Radder; *From Commodification to the Common Good* by Hans Radder

- Richard Levins and Richard Lewontin, "The Commoditization of Science"
- David Resnik, "Financial Interests and the Norms of Academic Science"

Week 15 Finale (12/11)

- THIRD EXAM/PAPER

Week 15 Finals (12/12–12/18)