

PHILOSOPHY OF SCIENCE (PHIL 41035)

KENT STATE UNIVERSITY

INSTRUCTOR: David Pereplyotchik

EMAIL: dpereply@kent.edu

OFFICE HOURS: Mondays/Wednesdays, 4-5pm; Tuesdays/Thursdays, 1-4pm; Friday, anytime.

REQUIRED TEXTS

1. Curd, Cover, and Pincock *Philosophy of Science: The Central Issues*
2. Peter Godfrey-Smith, *Theory and Reality: An Introduction to the Philosophy of Science*
3. Thomas Kuhn, *The Structure of Scientific Revolutions*
4. Jeffrey Kasser, *Philosophy of Science* [audiobook, available on audible.com and other sources]

OPTIONAL TEXTS

5. Stathis Psillos and Martin Curd, *The Routledge Companion to Philosophy of Science*
 6. Yuri Balashov and Alex Rosenberg, *Philosophy of Science: Contemporary Readings*
 7. Alex Rosenberg, *Philosophy of Science: A Contemporary Introduction*
 8. James Ladyman, *Understanding Philosophy of Science*
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COURSE DESCRIPTION

Science is arguably the supreme intellectual enterprise of our species. It pervades nearly every aspect of modern society. Scientific research is heavily funded by governments and private institutions; courses in science are requirements at every level of education; scientific accomplishments are honored with awards and prizes; museums display scientific achievements and inventions. And the sheer depth of scientific progress throughout human history is monumental. All of this raises questions about what science is, how it works, and how it manages to be as successful as it is. These questions define the philosophy of science—a branch of philosophy that aims to study science, to understand its goals and methods, its principles and practices, its failures and triumphs. In this course, we will address the following questions:

- What are the aims of science? How does science differ from other human enterprises?
- What is the source of the epistemic authority that science does (or should) enjoy in our society?
- What role do sociological, historical, and cultural factors play in science?
- What is the role of observations and experiments in obtaining scientific knowledge?
- How do scientists justify their claims? What is a scientific “proof”?
- What is the nature of scientific reasoning? In what sense can we say that it is reliable?
- Is there (anything like) a scientific method—an explicit recipe for making scientific discoveries?
- Under what conditions is a scientific theory confirmed or refuted?
- What constitutes a good explanation? Must genuine explanations cite causes, mechanisms, or laws?
- What is a scientific law? How do natural laws differ from other kinds of true generalizations?
- Does science require a special language? If so, how does that language relate to ordinary talk?
- What relationships hold between different scientific fields? In what sense must they be compatible?
- What is the relationship between philosophy and science? In what sense must *they* be compatible?
- In what ways does science constrain our approach to philosophical questions (and vice versa)?
- Are there any philosophical questions that cannot be addressed by scientific means? Why (not)?

COURSE REQUIREMENTS

Reading

Readings will be assigned for every class session. All readings are required. Some are required only for graduate students, and are marked “Advanced”. Still, I encourage everyone to read them.

I have selected the readings with an eye toward keeping them manageable, but please understand that the readings are often challenging and require serious effort. You will be expected to complete all readings for a class session *before* that session, so please prepare accordingly. Remember that philosophical writing often requires several readings before you fully grasp its meaning, and feel confident to evaluate it critically.

Seven micro papers (10% each, for a total of 70% of the final grade)

In addition to the two Macro Essays discussed above, you will be asked to submit five “micro” papers, 1000-1500 words long. The primary purpose of these assignments is to prepare you for class discussions that are based on those readings, so that class time is not wasted on merely rehearsing the main points from the assigned texts. The micro papers can also serve as a venue for your critical responses to the readings.

The micro papers will be graded on a 10-point scale. The only way to receive 0 points is to not submit a paper, or to submit one that is below the minimum word-count requirement (1000 words of content). A grade of 10 can only be awarded if the paper has critical responses to the texts. You will receive comments on some (but not all) of your micro papers. Those who include critical commentary will be given priority.

Final Macro Essay (20% of the final grade)

For undergraduate students, the required minimum length for the Macro paper is 2000 words [~6 pages] and a reasonable maximum would be 2500 words [~8 pages]. For graduate students, the required minimum is 2500 [~8 pages] words and a reasonable maximum would be 3000 words [~10 pages]. Graduate students will also be encouraged to use a broader range of sources in preparing their papers—readings that go beyond the syllabus. Everyone should consult with me prior to writing their papers.

I will provide instructions for each paper, and we will take some class time to go over the requirements for philosophical essays, with a focus on constructing an effective thesis statement and organizing your ideas into a cogent argument.

In general, philosophical writing should be clear, focused, persuasive, and attentive to every detail. Please avoid using jargon and ‘-isms’; wherever possible and express your ideas in commonsense terms, though always with an eye for academic standards of diction. The biggest factor in determining the grade on a philosophical paper is the strength of the overall argument, and the author’s ability to anticipate and forestall challenges to his or her claims and inferences. Also important is the author’s care with factual claims, as well as his or her comprehension of the course material. The grade is never based on the thesis that the author has chosen to put forward. The goal of this course is to teach students to reason well about difficult abstract issues. Success in the course consists in learning to argue well for your conclusions, whatever they are.

Class Participation (10% of the final grade)

Class participation consists in contributing to class discussion by asking questions or making comments that demonstrate both a grasp of the course material and an interest in the relevant topics. Also, in the spirit of collaborative learning, I will sometimes ask you to form *ad hoc* groups and work on a small question or task together. Participation, in such cases, means active engagement with the group, and substantive contributions to the groups final product.

The elements of class participation are listed below. As I observe the class discussion, I will use these criteria in evaluating your contributions.

1. present in class, awake, and attentive
2. shows evidence of having done the reading carefully, and thought about it in a sustained way
3. makes explicit reference to the text, and is good at choosing particularly relevant passages
4. helps classmates understand the passages/ideas/texts under discussion
5. engages in spirited but respectful debate
6. connects present readings/topics to ones discussed earlier in the semester
7. sheds new light on a particular reading or topic

To make the class participation grade as objective as possible, you will be asked to contribute to the discussion in the comments/messages throughout the class sessions. I will award participation points on the basis of the written contributions (as well as the spoken ones, obviously).

Although attendance is required, it does *not* count as class participation. I think of participation as a kind of intellectual investment, which goes beyond simply completing the reading and writing assignments. Public speaking is an essential aspect of the course, and also a requirement; no student can receive an A in the course without engaging actively in class discussion. Limited class participation credit can also be earned by engaging with me by email or at office hours.

ATTENDANCE

Attendance is mandatory; excessive absences or lateness (more than 2) will negatively impact your final grade in the course. More than 5 absences will constitute grounds for a failing grade. All students are expected to attend class session, join the video/audio feed on time. Students who are absent from class for religious reasons or due to documented medical treatment will not incur any penalty on their final grade, but are nevertheless responsible for all required reading/writing assignments. If you require technological assistance in order to join the sessions, please let me know about your issue in advance. I will help you in whatever way I can to resolve it.

GRADING

Here is a summary of how your final grade will be calculated:

- 70% of the final grade for the 5 micro papers (10% each)
- 20% of the final grade for the Macro Essay
- 10% of the final grade for class participation

A	96-100	B+	86-90	C+	71-75	D	55-60
A-	90-95	B	81-85	C	66-70	F	below 55
		B-	76-80	C-	61-65		

There is no “curve” for the course. This means that you are not in competition with your classmates for high grades. It is conceivable—though exceedingly unlikely—that everyone in the course will receive an A. Or, I suppose, a D. When you receive your final grade for the course, please note that it is non-negotiable. I will not change grades, unless I have made a demonstrable clerical error in my calculations.

OFFICE HOURS AND AVAILABILITY

My primary office hours are listed at the top of the syllabus. (This may change as the semester continues; I will announce any changes.) We can also have “virtual meetings” on Teams—whether in a group or one-on-one. In *extreme emergencies*, you can call/text me on my phone: 917.667.5838. Please do not abuse this mode of contact; act respectfully.

Needless to say, I can be reached by email at any time. I will do my best to respond to your emails as quickly as possible. Sometimes I will reply to your message immediately, but please do not assume that this is always possible. Occasionally, I will not have access to email or will not be able to answer your query for up to several days. In such cases, please be patient.

PLAGIARISM, CHEATING, USING AI, AND OTHER FORMS OF ACADEMIC DISHONESTY

Please note that I do not tolerate academic dishonesty in any form. I take a strict stance on this. Be aware that I will dole out maximum penalties for violations, including assigning failing grades and pushing for suspension and/or expulsion from Kent State. If you are unclear on what constitutes plagiarism or academic dishonesty, make it your business to learn about this immediately. Ignorance of university policy will not be accepted as an excuse. University policy 3-01.8 deals with the problem of academic dishonesty. The sanctions provided in this policy will be used to deal with any violations. If you have any questions, please read the policy at www.kent.edu/plagiarism

Important: *If I detect the use of artificial intelligence (“large-language models”) such as Chat GPT in any part of your work, you will immediately fail the course. There are no exceptions to this policy.*

INFORMATION FOR STUDENTS WITH DOCUMENTED DISABILITIES

Kent State University is committed to inclusive and accessible education experiences for all students. University Policy 3342-3-01.3 requires that students with disabilities be provided reasonable accommodations to ensure equal access to course content. Students with disabilities are encouraged to connect with Student Accessibility Services as early as possible to establish accommodations. If you anticipate or experience academic barriers based on a disability (including mental health, chronic medical conditions, or injuries), please let me know immediately.

Location: University Library, Suite 100

Email: sas@kent.edu

Phone: 330-672-3391

Web: www.kent.edu/sas

REGISTRATION AND WITHDRAWAL DEADLINES

University policy requires all students to be officially registered in each class they are attending. Students who are not officially registered for a course by published deadlines should not be attending classes and will not receive credit or a grade for the course. Each student must confirm enrollment by checking his/her class schedule, using Student Tools in FlashLine, prior to the deadline indicated. Registration errors must be corrected prior to that deadline. Information about official registration and withdrawal deadlines is available here.

<https://www.kent.edu/registrar/fall-important-dates>

<https://www.kent.edu/registrar/how-withdraw>

RELIGIOUS ACCOMMODATIONS

The University welcomes individuals from all different faiths, philosophies, religious traditions, and other systems of belief, and supports their respective practices. In compliance with University policy and the Ohio Revised Code, the University permits students to request class absences for up to three (3) days, per term, in order to participate in organized activities conducted under the auspices of a religious denomination, church, or other religious or spiritual organization. Students will not be penalized as a result of any of these excused absences.

The request for excusal must be made, in writing, no later than fourteen (14) days after the first day of instruction in a particular course and include the date(s) of each proposed absence or request for alternative religious accommodation. The request must clearly state that the proposed absence is to participate in religious activities. The request must also provide the particular accommodation(s) you desire.

You will be notified by me if your request for accommodation is approved, or, if it is approved with modification. I will work with you in an effort to arrange a mutually agreeable alternative arrangement. For more information regarding this Policy you may contact the Student Ombuds (ombuds@kent.edu).

COURSE SCHEDULE

The editors of our main textbook, Curd and Cover, *Philosophy of Science: The Central Issues*, have done a amazing job of summarizing and critically assessing all of the entries that they included in the volume. You should feel free to consult their introductory remarks to each section, as well as their extensive commentaries at the end of each section. However, please do not fall into the trap of reading these commentaries *instead* of the required material. Make sure to read the essays themselves, either before or after the commentaries.

Readings are designated as Introductory, Advanced, and Optional. Undergraduate students are responsible for the introductory material, and are encouraged (but not required) to tackle the advanced material. Graduate students are responsible for the introductory and advanced material. Some readings are optional for everyone; interested students are encouraged to take a look.

8/19, Week 1: Introduction

Introductory: Jeffrey Kasser, *Philosophy of Science*, Lecture 1

Advanced: Peter Godfrey-Smith, *Theory and Reality*, Chapter 1

Optional: Alex Rosenberg, *Philosophy of Science: A Contemporary Introduction*, ch. 1

8/26, Week 2: The Demarcation Problem

Introductory: Jeffrey Kasser, *Philosophy of Science*, Lectures 2 and 3
Michael Ruse and Larry Laudan, in Curd and Cover and also here
Karl Popper, "Science: Conjectures and Refutations", in Curd and Cover

Advanced: Paul Thagard, "Why Astrology Is a Pseudoscience"

Optional: Lakatos, "Science and Pseudoscience" in Curd and Cover

Micro 1: "Demarcation and Umbrellaology" (worth 10%). Due on 9/1, no later than midnight

9/9, Week 3: Logical Positivism

Introductory: Peter Godfrey-Smith, *Theory and Reality*, Chapter 2: Logic Plus Empiricism
Jeffrey Kasser, *Philosophy of Science*, Lectures 4-7

Advanced: Rudolph Carnap, "The Elimination of Metaphysics"

Optional: Schwartz, *A Brief History of Analytic Philosophy: From Russell to Rawls*, ch. 2
A. J. Ayer, *Language, Truth, and Logic*, chs. 1-3

9/16, Week 4: Quine's Critique of Positivism

Introductory: Jeffrey Kasser, *Philosophy of Science*, Lecture 8
Schwartz, *A Brief History of Analytic Philosophy*, ch. 3
Curd and Cover, "Commentary on Quine's 'Two Dogmas'"

Advanced: W. V. Quine, "Two Dogmas of Empiricism" in Curd and Cover and also here

Optional: Louise Antony, "Rabbit Pots and Supernovas" (section 2 only)
Jeffrey Kasser, *Philosophy of Science*, Lecture 25

Micro 2: Quine vs. Positivism (worth 10%), Due: 9/22, no later than midnight

9/23, Week 5: Induction and Confirmation

Introductory: Jeffrey Kasser, *Philosophy of Science*, Lectures 9-10
James Ladyman, *Understanding Philosophy of Science*, chs. 1-2

Advanced: Karl Popper, "The Problem of Induction" in Curd and Cover

Optional: Gilbert Harman, "Inductive Reasoning"
"Inference to the Best Explanation"

9/30, Week 6: Karl Popper on Induction and Nelson Goodman's "New Riddle"

Please hand in micro assignment 3 on The Problem of Induction (worth 10% of the final grade)

Introductory: Godfrey-Smith, *Theory and Reality*, chs. 3-4
Jeffrey Kasser, *Philosophy of Science*, Lectures 11-12

Advanced: Nelson Goodman, "The New Riddle of Induction"

Optional: Wesley Salmon, "Rational Prediction" in Curd and Cover

Micro 3: Problem of Induction (worth 10%), Due: 10/6, no later than midnight

10/7, Week 7: Thomas Kuhn on "Normal Science"

Introductory: Thomas Kuhn, *The Structure of Scientific Revolutions* (chs. 1-4)
Jeffrey Kasser, *Philosophy of Science*, Lectures 13-14

Advanced: Peter Godfrey-Smith, *Theory and Reality*, Ch. 5: Kuhn and Normal Science

Optional: Larry Laudan, "Kuhn's Critique of Methodology" in Curd and Cover

10/14, Week 8: Thomas Kuhn on the Structure of Scientific Revolutions

Introductory: Thomas Kuhn, *The Structure of Scientific Revolutions* (chs. 5-8)
Jeffrey Kasser, *Philosophy of Science*, Lecture 15

Advanced: Peter Godfrey-Smith, *Theory and Reality*, Chapter 6: Kuhn and Revolutions

Optional: Quine and Ullian, "Hypothesis"

Micro 4: Kuhn's account of "normal science" (worth 10%), Due: 10/20, no later than midnight

10/21, Week 9: Thomas Kuhn on Incommensurability Across Paradigms

Introductory: Thomas Kuhn, *The Structure of Scientific Revolutions* (chs. 9-12)

Advanced: Ernest McMullin, "Rationality and Paradigm Change in Science"

Optional: Larry Laudan, "Kuhn's Critique of Methodology"
Paul Churchland, *Scientific Realism and the Plasticity of Mind*, ch. 3

10/28, Week 10: Thomas Kuhn on the Nature of the Scientific Enterprise

Primary: Thomas Kuhn, *The Structure of Scientific Revolutions* (chs. 13-postscript)

Advanced: Bas van Fraassen, "Scientific Revolution/Conversion as a Philosophical Problem"

Micro 5: Kuhn on scientific revolutions (worth 10%), Due: 11/3, no later than midnight

11/4, Week 11: Introduction to the Debate over Scientific Realism

Introductory: Jeffrey Kasser, *Philosophy of Science*, Lectures 26-29
Godfrey-Smith, *Theory and Reality*, Ch. 12: Scientific Realism (pp. 173-189)

Advanced: James Ladyman, *Understanding Philosophy of Science*, chs. 5-6

Optional: Larry Laudan, "A Confutation of Convergent Realism"

11/11, Week 12: Scientific Realism

Introductory: Bas van Fraassen, "Arguments Concerning Scientific Realism"

Advanced: James Ladyman, *Understanding Philosophy of Science*, chs. 7-8

Optional: Paul Churchland, "The Ontological Status of Observables:
In Praise of Super-Empirical Virtues"

Micro 6: Scientific Realism (worth 10%), Due: 11/17, no later than midnight

11/18, Week 13: Quantum Mechanics: A Non-Mathematical Introduction

Introductory: John Polkinghorne, *Quantum Theory: A Very Short Introduction* (all except ch. 4)

Advanced: Brian Greene, *Fabric of the Cosmos: Space, Time, and the Texture of Reality*, chs. 4 & 7

Optional: Manjit Kumar: *Quantum: Einstein, Bohr, and the Great Debate about Reality (Part 1)*

Micro 7: Quantum Mechanics (worth 10%), Due: 12/1, no later than midnight

12/2: Week 14: Quantum Mechanics and Scientific Realism

Introductory: David Mermin, "Is the Moon There When Nobody Looks?
Reality and the Quantum Theory"

Advanced: Manjit Kumar: *Quantum: Einstein, Bohr, and the Great Debate about Reality (Part 3)*

Optional: Manjit Kumar: *Quantum: Einstein, Bohr, and the Great Debate about Reality (Part 4)*

Macro paper due on Friday 12/13 at midnight (worth 20% of the final grade)
