

PHILOSOPHY OF SCIENCE

KENT STATE UNIVERSITY

INSTRUCTOR: David Pereplyotchik
EMAIL: dpereply@kent.edu
OFFICE HOURS: Tues Noon-5pm

REQUIRED TEXTS

1. Martin Curd and J. A. Cover, *Philosophy of Science: The Central Issues* (2nd edition)
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]

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* (2nd ed.)
8. A. J. Ayer, *Language Truth and Logic* (*strongly encouraged for graduate students)

Note: Many topics will require supplementary literature, which I will distribute over the web.

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 is science? What are its aims? How is it different from other human enterprises?
- What is the role of observations and experiments in obtaining scientific knowledge?
- What role do sociological, historical, and cultural factors play in science?
- 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 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?
- What is a scientific law?
- Does science employ or require a special language?
- What relationships hold between different scientific fields?
- What is the relationship between philosophy and science?
- In what ways does science constrain our approach to philosophical questions?
- Are there philosophical questions that cannot be addressed by scientific means?

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 as such. 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.

Three Marco Essays (**20% each**, for a total of **60%** of the final grade)

This course is intended to improve your writing skills and to enhance your use of writing as a tool for critical thinking and reflection. In keeping with these goals, I will ask you to write three long papers, as well as several shorter assignments. For undergraduate students, the minimum length of each long paper is 2000 words [~6 pages] and the maximum length is 2500 words [~8 pages]. For graduate students, the minimum is 2500 [~8 pages] words and the maximum is 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. Please consult with me prior to writing a paper.

Due dates will be announced approximately two weeks in advance. I will provide instructions 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.

Although assigning grades to philosophical essays is often assumed to be totally unconstrained or “subjective,” there are, in fact, specific guidelines that are relatively well-defined and common to nearly all institutions of higher learning. Here is a link to a grading rubric that adequately captures my own method of evaluation: <http://tinyurl.com/ocy4yn7>

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.

Students who receive a B or below on their first paper will be given a chance to submit a revised draft for a higher grade. You will have at most **1 week** from the day the paper was returned to you to complete the revision. When revising your paper, make sure to take into account all of the comments and suggestions that I put on it, as well as any comments that you receive from your peer reviewers. **Important:** When turning in a revised version of your paper, please make it clear which words, sentences, or paragraphs were revised, by casting them in a different color. Note that *I will not accept the revision* if this requirement is not met.

Six Critical Response Papers (5% each, for a total of 30% of the final grade)

In addition to the three major papers, discussed above, you will be asked to submit six short critical responses to the readings. Each critical response should be 500-750 words long (strict limits), and should address the material from the prior week. The primary purpose of these assignments is to serve as a venue for your critical reactions to the texts, in which you carefully evaluate the claims, arguments, and theories that you encounter in the readings. Needless to say, a good deal of summarization is also required, in order to let me know what exactly you're addressing.

The critical responses will be graded on a 5-point scale. Each point is worth 1% of the final grade. The only way to receive 0 points is to not submit a response, or to submit one that is so far below the word-count requirement that it effectively counts as not submitting anything.

In addition to a grade, you will receive comments on some of your critical responses, though not all. Please feel absolutely free to use your ideas from the critical responses in your long papers. That's actually part of their purpose. You should, however, make revisions to those ideas in light of the feedback that you receive from me.

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 write down some keywords from your contribution to the class discussion at the end of each class session.

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. A sign-in sheet will be passed around at the beginning of each class session. All students are expected to come to class on time and to be engaged for the length of the class session. 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.

GRADING

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

- 60% of the final grade the major papers (20% each)
- 30% of the final grade for the six short critical responses (5% each)
- 10% of the final grade for class participation

The following provides a translation from the numerical score to a letter grade:

A	91-100	B+	81-85	C+	66-70	D	51-55
A-	86-90	B	76-80	C	61-65	F	below 51
		B-	71-75	C-	56-60		

Late papers will be accepted, but will be penalized an entire letter grade for each 24-hour period of lateness. Late critical responses will also be accepted, but will be penalized by either 1 or 2 points, depending on how late they are submitted. Students submitting long-overdue responses should expect to receive only 1 point of credit.

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

As noted above, my primary office hours are on Tuesdays, between noon and 5pm. (This may change as the semester continues; I will announce any changes.) If you want to meet with me at some other time, let me know and we can try to arrange it. If you prefer to meet somewhere on campus other than my office or the student center, let me know and we’ll see what we can work out. (It won’t always be possible, of course.) In general, I’m quite flexible; my only strict rule is that I cannot meet with you on the weekends.

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, even at odd hours, like 4am. However, please do not assume that this is always possible; there is great variability. Indeed, 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.

There are many other means of contacting me, including Skype, GoogleChat, iChat, and the like. I am open to all of these options, if you prefer to use them. In extreme emergencies, you can call or text message me on my phone: 917.667.5838. In saying this, I am allowing what most other professors would see as an excessive intrusion into my private life. Keeping this in mind, I ask that you please act respectfully, and do not abuse this mode of contact. Please explore all other avenues before resorting to phone calls or text messages.

GENERAL ETIQUETTE

- Please silence your cell phone (or, better yet, turn it off entirely) prior to entering the classroom. Do not use it during class for anything. This includes text messaging and taking notes. *Leave your phone in your bag*. If your phone rings—especially if your ringtone is some cheesy R&B club hit—you'll not only look silly in front of everyone, but you'll also disturb the class. If this happens more than once, I will lower your final grade by 2%.
- Laptops are permitted in class, but solely for the purpose of taking notes. If I find that you are using your laptop for any other purpose (as is typically obvious), I will ask you never to use your laptop in the classroom. Having a laptop in the classroom is not a right; it's a privilege. Please use it responsibly.
- Please treat your email correspondences with me as professionally as possible. Make sure to include your full name in the body of the email. Write in grammatical English sentences, separated into paragraphs where necessary. I do not want to see any of the following in your email: 'LOL', 'plz' (instead of 'please'), '2' (instead of 'to' or 'too'), 'u' (instead of 'you'), 'r' (instead of 'are'), 'your' (instead of 'you're', or vice versa), multiple question marks at the end of a sentence, multiple exclamation points at the end of a sentence, multiple consecutive commas anywhere in the email, unnecessary quotation marks, advertisements, entire paragraphs written in ALL CAPS, entire paragraphs written in *italics*, and so on.
- Please do not "reply-all" to any mass mails that I send to the entire class. If you need to email me directly, please start a brand new private email thread.
- Please avoid coming to class late. It's distracting and disrespectful. Please make every effort to get to class on time. If you do happen to come into the classroom late, please find the seat closest to the door, and move to it quietly and respectfully, without disturbing the ongoing discussion.
- Repeated failure to abide by any of these policies will result in a decrease in your final grade.

PLAGIARISM, CHEATING, 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 <http://tinyurl.com/kentplagiarismpolicy>

INFORMATION FOR STUDENTS WITH DOCUMENTED DISABILITIES

University policy 3-01.3 requires that students with documented disabilities be provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact me at the beginning of the semester to make arrangements for necessary adjustments. Please note, you must first verify your eligibility for these through Student Accessibility Services. Contact 330-672-3391 or visit www.kent.edu/sas for more information on the relevant procedures.

REGISTRATION AND WITHDRAWAL DEADLINES

The official registration deadline for this course is **September 11th, 2016**. 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. The course withdrawal deadline is **November 6th, 2016**.

COURSE SCHEDULE

Readings marked with an asterisk (“*”) will be made available on Blackboard. All other readings are from one or another of the required texts. Most of the readings are contained in the Curd, Cover, and Pincock collection, *Philosophy of Science*. Note that the editors of that collection have done a masterful job of summarizing and critically assessing all of the entries. 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, Primary, or Advanced. Undergraduate students are responsible for the introductory and primary material, and are encouraged (but not required) to tackle the advanced material. Graduate students are responsible for the primary material and the advanced material that is marked “required for graduate students”. Advanced readings that are not marked that way are optional for everyone. Graduate students are encouraged to take a pass through the introductory material—particularly those for whom this is a first encounter with analytic philosophy.

Week 1: Introduction

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

Primary: Godfrey-Smith, *Theory and Reality*, Chapter 1

Advanced: *Rosenberg, *Philosophy of Science: A Contemporary Introduction*, Chapter 1
(required for graduate students)

Week 2: The Demarcation Problem

Introductory: Kasser, *Philosophy of Science*, Lectures 2 and 3

Primary: Popper, "Science: Conjectures and Refutations"
*Michael Ruse and Larry Laudan: An exchange about creationism, law, and public education

Advanced: Thagard, "Why Astrology Is a Pseudoscience" (required for graduate students)

Assignment: Umbrellaology

Week 3: Logical Positivism

Introductory: Godfrey-Smith, *Theory and Reality*, Chapter 2: Logic Plus Empiricism (pp. 19-37)
Kasser, *Philosophy of Science*, Lectures 4-7

Primary: *Ayer, *Language, Truth and Logic*, chs. 1-3

Advanced: *Ayer, *Language, Truth and Logic*, chs. 5, 8 (required for graduate students)
*Carnap, Hahn, and Neurath, "The Scientific Conception of the World: The Vienna Circle"

Week 4: Quine's Critique of Positivism

Introductory: Kasser, *Philosophy of Science*, Lecture 8

Primary: Quine, "Two Dogmas of Empiricism"
Curd, Cover, and Pincock, "Commentary on Quine's 'Two Dogmas'"

Advanced: Gillies, "The Duhem Thesis and the Quine Thesis" (required for graduate students)

Week 5: Induction and Confirmation

Introductory: Godfrey-Smith, *Theory and Reality*, Ch. 3: Induction and Confirmation (pp. 39-56)
Kasser, *Philosophy of Science*, Lectures 9-10

Primary: Hume, *Enquiry*, §4 and the first part of §5
Lipton, "Induction"

Advanced: Goodman, "The New Riddle of Induction" (required for graduate students)

Week 6: Karl Popper on Induction (*inter alia*)

Introductory: Godfrey-Smith, Ch. 4: Popper: Conjecture and Refutation (pp. 57-74)
Kasser, *Philosophy of Science*, Lectures 11-12

Primary: Popper, "The Problem of Induction"
Salmon, "Rational Prediction"

Advanced: Hempel, "Criteria of Confirmation and Acceptability" (required for graduate students)

1st macro essay due roughly at this point; exact date TBA

Week 7: Thomas Kuhn on "Normal Science"

Introductory: Godfrey-Smith, *Theory and Reality*, Ch. 5: Kuhn and Normal Science (pp. 75-86)
Kasser, *Philosophy of Science*, Lectures 13-14

Primary: Kuhn, *The Structure of Scientific Revolutions* (chs. 1-8)

Advanced: McMullin, "Rationality and Paradigm Change in Science" (required for grad students)

Week 8: Thomas Kuhn and the Structure of Scientific Revolutions

Introductory: Godfrey-Smith, *Theory and Reality*, Chapter 6: Kuhn and Revolutions (pp. 87-101)
Kasser, *Philosophy of Science*, Lecture 15

Primary: Kuhn, *The Structure of Scientific Revolutions* (chs. 8-end)

Advanced: Laudan, "Kuhn's Critique of Methodology" (required for graduate students)
Kuhn, *The Structure of Scientific Revolutions* (postscript)

Week 9: After Kuhn: Lakatos, Laudan, Feyerabend

Introductory: Godfrey-Smith, Ch. 7: Lakatos, Laudan, Feyerabend (pp. 102-121)
Kasser, *Philosophy of Science*, Lecture 16-17

Primary: *Feyerabend "How to be a Good Empiricist"
*Quine and Ullian, "Hypothesis"

Advanced: Godfrey-Smith, Ch. 10: Naturalistic Philosophy in Theory and Practice (pp. 149-162)
Ch. 11: Naturalism and the Social Structure of Science (pp. 163-172)

Week 10: Churchland on Perception, Meaning, Scientific Realism, and Reduction

Introductory: Kasser, *Philosophy of Science*, Lecture 23-25

Primary: Churchland, *Scientific Realism and the Plasticity of Mind*, ch. 1-3

Advanced: Nagel, "Issues in the Logic of Reductive Explanations"
Fodor, "Special Sciences, Or the Disunity of Science as a Working Hypothesis"

Week 11: Reduction and Explanation

Introductory: Godfrey-Smith, *Theory and Reality*, Chapter 13: Explanation (pp. 190-201)
Kasser, *Philosophy of Science*, Lectures 18-20

Primary: Hempel, "Two Basic Types of Scientific Explanation"
Kitcher, "Explanatory Unification"

Advanced: Hempel, "The Thesis of Structural Identity" (required for graduate students)
*van Fraassen, "The Pragmatics of Explanation," Boyd, Gasper, Trout, pp. 317-327
Kitcher, "1953 and All That: A Tale of Two Sciences"

2nd macro essay due roughly at this point; exact date TBA

Week 12: Scientific Realism, Part I: The Challenge from Constructive Empiricism

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

Primary: Maxwell, "The Ontological Status of Theoretical Entities"
van Fraassen, "Arguments Concerning Scientific Realism"

Week 13: Scientific Realism, Part II: The Realist Response

Introductory: Kasser, *Philosophy of Science*, Lecture 27

Primary: Musgrave, "Realism versus Constructive Empiricism"

Advanced: *Churchland, "The Ontological Status of Observables: In Praise of Super-Empirical Virtues," *Images of Science* Ed. Paul M. Churchland and Clifford A. Hooker, Chicago, 1985. (required for graduate students)

Week 14: Scientific Realism, Part III: The Natural Ontological Attitude

Introductory: Godfrey-Smith, *Theory and Reality*, Ch. 15: Empiricism, Naturalism, and Scientific Realism?
Kasser, *Philosophy of Science*, Lectures 28-29

Primary: Fine, "The Natural Ontological Attitude"
Musgrave, "NOA's Ark: Fine for Realism"

Advanced: Laudan, "A Confutation of Convergent Realism" (required for graduate students)

3rd essay due roughly at this point; exact date TBA