

Phil 220: Philosophy of Science

(Current as of 3/8/2024)

Class Time: 2:30-3:45 MW

Location: Mosse Humanities 2115

Canvas Page:

<https://canvas.wisc.edu/courses/393226>

Instructor: Matthew J. Maxwell

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Office: Helen C. White 5146

Office Hours: 12-2 M or by appointment

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COURSE DESCRIPTION

This course will cover several broad questions in the philosophy of science, including: What is the logic of scientific reasoning? How should science be distinguished from pseudo-science? What makes science different from other human pursuits, such as religion? Is science objective? How do moral and social issues arise in and influence scientific research? How should moral and

social issues influence scientific research? Other questions may be addressed in the course of the semester.

This course will be accessible to all students, regardless of background in the sciences.

Learning Outcomes

- Students will develop an understanding of some major issues in the philosophy of science.
- Students will develop critical reasoning skills applicable, not only to science, but many other fields as well.
- Students will learn to use resources including primary texts and discussion with peers in order to reason about and understand difficult topics.

Required Texts

All required texts will be available via either the [library](#) or the course [Canvas](#) site.

Credit Hour Explanation (3 credits)

This class meets for a total of 3 class period hours each week over the semester and carries the expectation that students will work on course learning activities (reading, writing, studying, etc.) for about 2 hours outside of the classroom for every class period hour.

Prerequisites

None

CLASSROOM DISCUSSION NORMS

- Listen actively and with an ear to understanding others' views. (Don't just think about what you are going to say while someone else is talking.)
- Criticize ideas, not individuals. We all can learn something from each other, even if our views don't necessarily align.
- Allow everyone the chance to speak.
- If you think something is missing from the conversation, don't wait for someone else. Make the contribution yourself.
- Ask questions when you do not understand. Chances are that others also do not understand.
- Try not to silence yourself out of concern for what others think. So long as your contribution is sincere (i.e. not trolling), your perspective is likely useful.

ASSIGNMENTS

Document Based Essays (3 x 9 pts)

Document Based Essays will be on a reading and question which will be assigned one week before they are due. They should be about 1200-1500 words in length (4-5 pages) and will require you to synthesize and apply the previous weeks' material (which may be cumulative). You are encouraged to discuss the assignment with other students in the class, however, you may not hand in substantially the same essay as another student. Your words should be your own.

- **Essays will be graded on three components:**
 1. Full and correct reconstruction of the document's argument (3 pts)
 2. Full and correct exposition of the relevant concepts or arguments (3 pts)
 3. Compelling argument free from logical fallacies for the essay's thesis (3 pts)
- **Each component will be graded out of 3 points:**
 - Clearly adequate (full credit) = 3
 - Neither clearly adequate nor clearly inadequate (partial credit) = 2
 - Clearly inadequate (minimal credit) = 1

More detailed instructions will be provided with each question and document.

Canvas Discussion Questions (7 x 1 pts)

Every other week (plus first week introductions) you will be required to post a question for discussion on Canvas. These will be due Sundays at 11:59 pm.

Discussion questions demonstrate an effort at understanding the assigned reading and engage with the text in some significant way. They are more than a generic one-line question. Good discussion questions will be about 100 words in length and explain why the question is relevant in some detail. Some possible question types are:

- What does the text say? (Be specific about what you don't understand.)
- How does the author argue for their conclusion?
- Draw out some consequences of the text and raise a worry.
- Present a problem for the author's argument or conclusion.
- Other question types are possible!

These discussion questions will be graded for completion only, but will be used to structure class discussion, so the more engaged your questions, the more compelling and useful class discussion will be!

Canvas Discussion Replies (7 x 1)

Every week that you are not posting a discussion question (plus first week introductions) you will be required to reply to a discussion question. These will be due Tuesdays at 11:59 pm.

Replies demonstrate an effort at understanding the assigned readings and engage with the question in some significant way. They are more than a generic one-line answer or affirmation. Good replies will be about 100 words in length.

These discussion questions will be graded for completion only, but will be used to structure class discussion, so the more engaged your replies, the more compelling and useful class discussion will be!

Attendance

I will not be taking attendance for this class, however, part of my role as instructor is to make class time worth your while. If you do not attend class it is unlikely you'll learn the required material or do well on the exams.

When you attend class, please be considerate of those around you. Stay focused on our class material and discussion. If you have other priorities during class time (other classes, watching videos, sharing memes), please do not attend.

Final Exam (9)

The final exam for this course will be a take home Document Based Essay as described above. It will be due Monday May 6th at 11:59pm.

GRADES

Grade	A	AB	B	BC	C	D	F
%	100-93%	92-88%	87-83%	82-78%	77-70%	69-60%	Below 60
Points	50-47	46-44	43-42	41-39	38-35	34-30	29-0

With this grading scheme and assignment structure, you must turn in all assignments, including discussion posts, to do well. If you find yourself falling behind or getting many 1s on graded assignments please [reach out to me](#) as soon as possible so that we can discuss options for getting you back on track.

COURSE SCHEDULE

(Subject to change. See [Canvas](#) for the latest version.)

Week	Topic	Readings	Assignments
1/24/2024	What is Philosophy of Science?	Stemwedel 2014 " What is Philosophy of Science? "; Smith 2017 " Why philosophy is so important in science education "	Discussion Board Introductions
Confirmation & Evidence			
1/29/2024	Induction & Deduction	Bacon 1620, <i>Novum Organum</i> , Aph. I-XXI Ladyman, "Induction and Inductivism" in <i>Understanding Philosophy of Science</i> ; Hempel 1966, "Scientific Inquiry: Invention and Test"; Recommended: Sober 2002, "Intelligent Design and Probability Reasoning" Wireless Philosophy 2020, " Is a red apple proof that all ravens are black? A paradox of scientific logic "	A-L Discussion Question; M-Z Discussion Reply
2/5/2024	Simplicity, Beauty, and Truth	Newton 1687, "Rules for the Study of Natural Philosophy" in <i>The Principia</i> Lipton 2006, "Inference to the Best Explanation" Hossenfelder 2018, " Beauty is truth, truth is beauty, and other lies of physics " Sober 2016, " Are scientific theories really "	M-Z Discussion Question; A-L Discussion Reply

		better when they are simpler?” Recommended: Gell-Mann 2007, “ Beauty, truth, and...physics? ”	
2/12/2024	Bayesianism & Frequentism	Colquhoun, “ The Problem With P-Values ”; Goodman 1999, “Toward Evidence-Based Medical Statistics. 1 The P Value Fallacy”; Titelbaum 2024, “ How to think like a Bayesian ”; Sober “Probability Primer” in <i>The Design Argument</i> Recommended: Climenhaga 2019, “ The concept of probability is not as simple as you think ”;	A-L Discussion Question; M-Z Discussion Reply
2/19/2024	The Problem of Induction	Hume 1748, <i>Enquiry</i> Sect. IV; Feldman, <i>Epistemology</i> Chapter 7; Salmon 1991 “Hans Reichenbach’s Vindication of Induction”	Essay 1 Assigned: M-Z Discussion Question; A-L Discussion Reply
Science, Non-Science, and Pseudoscience			
2/26/2024	Falsificationism and Pseudoscience	Popper 1963, “Science as Falsification”; Levenson 2016, “ Epic Fails ” Duhem (1906), “Physical theory and experiment”; Thagard 1978, “Why Astrology is a Pseudoscience”; Optional: Bok, et al. 1975, “Objections to Astrology”	Essay 1 Due; A-L Discussion Question; M-Z Discussion Reply

3/4/2024	Science and Non-Science	Sober, “Why Methodological Naturalism?”; Wylie 2015, “A Plurality of Pluralisms”; Parke & Hikuroa “Against Defending Science”	M-Z Discussion Question; A-L Discussion Reply
3/11/2024	Scientific Method	Brown 1986, “Thought experiments since the scientific revolution” Cleland 2001, “Historical science, experimental science, and the scientific method” Feyerabend, “How to Defend Society Against Science” Recommended: Mulkay & Gilbert 1981, “Putting philosophy to work: Karl Popper's influence on scientific practice”	Essay 2 Assigned A-L Discussion Question; M-Z Discussion Reply
Objectivity, Truth, and Values			
3/18/2024	Scientific Revolutions	Kuhn <i>The Structure of Scientific Revolutions</i> , selections; Laudan “The rationality of paradigm shifts” Ruse 1971, “Two Biological Revolutions”	Essay 2 Due M-Z Discussion Question; A-L Discussion Reply
Spring Break			
4/1/2024	Models and Truth	Wimsatt 1987, “False models as a means to truer theories” Potochnik 2017, <i>Idealization and the Aims of Science</i> , chapter 1 Parker 2010, “Scientific Models and Adequacy-forPurpose.”	A-L Discussion Question; M-Z Discussion Reply
4/8/2024	Values in Science	Longino 1990, “Values and Objectivity”	Essay 3 Assigned

		Sober 2007 “Evidence and Value Freedom”; Rudner 1953, Rudner “The scientist qua scientist makes value judgments”; Douglas 2000, “Inductive risk and values in science”	M-Z Discussion Question; A-L Discussion Reply
Science and Society			
4/15/2024	Disagreement	Zollman “What it Means When Scientists Disagree” De Cruz & De Smedt, “The Value of Epistemic Disagreement in Scientific Practice: The Case of Homo Floresiensis”	Essay 3 Due A-L Discussion Question; M-Z Discussion Reply
4/22/2024	Science and Democracy	Kitcher, “Well-Ordered Science” in <i>Science, Truth, and Democracy</i>; King, et al, “Identifying Difference, Engaging Dissent”;	M-Z Discussion Question; A-L Discussion Reply
4/29/2024	Ethics of Inquiry	Karen Frost-Arnold 2012, “Moral trust & scientific collaboration”; Kitcher 1997, “An argument about free inquiry”; Avin 2017, “Science funding is a gamble so let’s give out money by lottery”	Final Exam Assigned (Due 5/6)

ACCOMMODATIONS

While some discomfort is expected when discussing difficult topics, harm is never a positive outcome. Some of the material in this course may be extremely personal or otherwise distressing

to some students. If this is the case for you, please [reach out to me](#) so that we can make adjustments or devise alternatives as necessary.

If you have learning accommodations through the McBurney Center, please [let me know](#) as early in the semester as possible. More information is available at <https://mcburney.wisc.edu/>

PHILOSOPHICAL WRITING TUTOR

Our department is excited to offer tutoring in philosophical writing. Our tutor can help with writing assignments at any stage of the process—that includes just not knowing how to start. The earlier the better! Besides understanding the unique features of philosophical writing style, the tutor can offer additional suggestions about how to approach readings and think through the ideas in our course. Good philosophical writing starts with a thorough understanding of the various questions we'll explore and, most importantly, formulating your own stance on those questions.

Drop-in hours: Mondays 1:00-2:00pm and Thursday 10:00-11:00am in HCW 5174

To make an appointment, contact:

Hubert Marciniiec

Email: marciniiec@wisc.edu

A NOTE ON PLAGIARISM

All work turned in for this course must be your own. When using the words and ideas of others you must cite them as appropriate. While AI tools are appropriate for checking grammar or re-wording passages that you have written, they are not appropriate for generating responses or writing essays (and will frequently lead to wrong answers). Work that I determine is not your own will, at minimum, receive a score of 0 and may be subject to further [sanctions](#).

ACADEMIC STATEMENTS & POLICIES

Additional statements and policies regarding this course are available at <https://guide.wisc.edu/courses/#syllabustext>