

Philosophical Problems in Cosmology - Fall 2020

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I take the ongoing situation with Covid-19 very seriously, as I hope all of you do. I consider it to be my responsibility to do everything I can to ensure that this class is safe for all of you, and for all of the people that we come into contact with. In this class, we will all wear masks 100% of the time, with no exceptions. Additionally, we will socially distance to the greatest degree possible given the size and layout of the classroom. If you do not rigorously adhere to these policies, you will be asked to leave the class and not return.

If you have a fever or are otherwise not feeling well, it is imperative that you do not come to class. In such a circumstance, please email me as soon as possible to let me know. Quizzes that you miss due to illness will not be held against you if I receive email notification prior to class. I intend to record each lecture and will be happy to provide those recordings to anyone who misses a class due to illness.

If you'd like to discuss anything pertaining to the course or its subject matter, please email me to arrange an appointment for a zoom meeting.

For those classes in the first week of the quarter and following the Thanksgiving break, we will meet virtually using Zoom. The zoom information is as at the end of this syllabus.

Grading:

Midterm Paper - 30%

Final Paper - 30%

Quizzes (not announced) - 25%

Participation/Attendance - 15%

Quizzes will cover material discussed in lectures, as well as assigned readings. They will not be announced in advance; a choice designed to encourage class attendance. For this reason, make-up quizzes will not generally be allowed (except in the case of illness, as described above).

Topics to be covered in the course include:

Pre-scientific ideas about cosmology

Cosmology's role in the birth of science

What science is and what science does

Measurement, meaning and relativity
Positivism, realism, abduction
Interpretations of quantum mechanics
Realism and anti-realism
Mathematical Platonism, and the role of mathematics in science
Are there other universes? If so, what does this mean?
Applications of the anthropic principle
The ultimate limits of cosmology
Why is there something rather than nothing?

This course will cover not only what astronomers and physicists have learned about the universe, but will also emphasize how they learned it and why they think it is true (and well as what it means to make such claims). These discussions will necessarily involve excursions into the history of science, philosophy of science, and science itself. I strongly encourage class participation. Active debate and discussion will constitute substantial and important aspects of this course.

Over the course of the quarter, you can expect regular readings to be assigned. The reading list will include books and articles by both scientists and philosophers. Although it is subject to change, I anticipate the assigned readings to consist of the following books and articles:

Steven Weinberg, *To Explain the World*
Karl Popper, “Science: Conjectures and Refutations”
Thomas Kuhn, “The Logic of Discovery of Psychology of Research?”
A.J. Ayer, *Language, Truth and Logic* – Chapters 1-3
Dan Hooper, *At the Edge of Time*
Sean Carroll, *Something Deeply Hidden*
Sean Carroll, “Why is there something rather than nothing?”
Sean Carroll, “Beyond Falsifiability: Normal Science in a Multiverse”
John Ellis and Joseph Silk, “Defend the integrity of physics”
Bas Van Fraassen, “Arguments Concerning Scientific Realism”
James Robert Brown, “Explaining the Success of Science”
David Albert, “NYT Review of ‘A Universe From Nothing’”
Scientific American on Krauss/Albert debate; Krauss interview in the Atlantic

I will provide each of these readings, with the exceptions of: 1) Weinberg’s, *To Explain the World*, 2) Hooper’s, *At the Edge of Time*, and 3) Carroll’s, *Something Deeply Hidden*.

The detailed requirements and parameters of the midterm and final papers will be described later in the quarter. I have in mind two, approximately 10-page essays

on topics related to the course. I expect these papers to be thoughtful and well written.
