Omar Fakhri
Philosophy of Science

Course Description

This course contains three parts: general philosophy of science, philosophy of physics, and philosophy of biology. The first part of this course will cover general questions that applies to science more generally. Examples: Are all scientific theories underdetermined by competing rival theories? Is inductive reasoning (i.e. the primary method used by science) reliable? How should we understand the laws of nature? How should we understand causation? The second part of this course covers philosophy of physics. We will focus on issues about space and time in classical physics and relativistic physics. We will also look at two different interpretations of quantum physics: the GRW and Bohmian interpretations. The last part of this class is philosophy of biology. Here are some example questions from this section: Is there design in nature? If so, what explains it? Are there natural kinds, such as species? If so, is this compatible with evolutionary theory?

Course Requirements:

- Biweekly Assignments 40% – These are short reaction papers between 400-500 words. You are expected to summarize an important part of the reading and then critically evaluate it.

Pick only **one** of the following requirements (note: for those interested in applying to graduate programs in philosophy, I highly recommend doing the latter option):

- Three Papers 20% each – These are shorter papers, about 5-7 double-spaced pages. Prompts will be handed out a week before the paper is due.

Or

- Long Paper 60% - This is a substantial paper, about 15 double-spaced pages. You will be required to get your paper topic approved by me first. Ideally, you should aim to do this at least a month before the paper is due. This paper will engage with a big bulk of the assigned readings and perhaps some outside sources as well. If you decide to write this paper instead of the three short papers, please let me know as soon as you make this decision. I will provide extensive comments on this paper, and I would be happy to read future drafts of it, even after the class is over.

Required Text:

There are no required texts. The readings will be handed out.

Course Schedule

Part: General

Week 1: Verificationism

A. J. Ayer: Language, Truth, and Logic, ch. 1
Lawrence Sklar: Space, Time, and Spacetime, ch. 2

Week 2: The problem of underdetermination

Pierre Duhem: Physical Theory and Experiment
Andre Kukla: Does Every Theory Have Empirically Equivalent Rivals?

Week 3: Responses to underdetermination

Laudan & Leplin: Empirical Equivalence and Underdetermination
Kristen Intemann: Feminism, Underdetermination, and Values in Science

Week 4: The problem of induction

Hume: Skeptical Doubts Concerning the Operations of the Understanding
Nelson Goodman: The New Riddle of Induction

Week 5: Responses to induction

Hans Reichenbach: The Pragmatic Justification of Induction
Wesley Salmon: Rationality and Objectivity in Science

Week 6: Humeanism vs anti-humeanism about laws

Helen Beebee: The Non-Governing Conception of Laws of Nature
Barry Loewer: Humean Supervenience

Week 7: Causation

Nancy Cartwright: Causal Laws and Effective Strategies
Mills & Beatty: The Propensity Interpretation of Fitness

Part 2: Physics

Week 8: Space and time in classical physics

Lawrence Sklar: Space, Time, and Spacetime, ch. 3
Shamik Dasgupta: Substantivalism vs Relationalism about Space in Classical Physics

Week 9: Space and time in relativistic physics

Tim Maudlin: Philosophy of Physics: Space and Time, ch. 4
Tim Maudlin: Philosophy of Physics: Space and Time, ch. 6

Week 10: Interpretations of Quantum Physics

David Albert: Quantum Mechanics and Experience, ch. 5
David Albert: Quantum Mechanics and Experience, ch. 7

Part 4: Biology

Week 11: Demarcation

Elliott Sober: Philosophy of Biology, ch. 2
Thomas Nagel: Public Education and Intelligent Design

Week 12: Design Argument

Elliott Sober: The Design Argument*
Robin Collins: God, Design, and Fine-Tuning

Week 13: Species

Ian Hacking: A Tradition of Natural Kinds
Philip Kitcher: Some Puzzles about Species

Week 14: Extra Time