

General Philosophy of Science and Philosophy of Biology

Instructor: Josh DiPaolo

Everyday, mostly without incident, millions of people travel in airplanes, take medicine, give birth, work on their computers, or talk on their smart phones. These technological achievements depend on the success of science. Scientists have acquired the knowledge of aerodynamics, chemistry, physiology, biology, anatomy, physics and other fields that make these achievements possible. Thus, everyday millions of people rely on science. Many do so unreflectively, without asking about the nature of science. In this class, however, we will reflect philosophically on science: we will attempt to understand the nature of science, how it progresses, and what its shortcomings are. These are questions in the *general philosophy of science* and they are the questions to which we'll dedicate the first two-thirds of the course. Each science raises its own interesting philosophical questions. To illustrate, in the last third of the course, we will study the philosophy of biology, as explained by one of the field's pioneers.

Some Course Questions

- How should scientists test hypotheses, and when does evidence confirm hypotheses?
- What is scientific explanation?
- How does science progress? Is scientific progress always rational?
- Is science totally objective? Or does it depend on the values and interests of its practitioners?
- How exactly does evolution by natural selection work?
- What distinguishes scientific theories from non-scientific theories? Are creationism and evolutionary theory equally good theories?
- How can evolutionary theory explain non-self interested, altruistic behavior in non-human organisms?

Books:

G. Barker & P. Kitcher, *Philosophy of Science: A New Introduction*

E. Sober, *Philosophy of Biology* 2nd Edition.

Recommended: T. Kuhn, *The Structure of Scientific Revolutions* 3rd Edition. [This is the book that got me interested in the philosophy of science. It is absolutely fascinating!]

Requirements:

Exam 1:	18%
Exam 2:	22%
Exam 3:	30%
5 Mini Philosophy in Life Papers	25%
Attendance & Engagement	5%

Exams

For each unit of this course, you will take an exam. Exams increase in grade percentage because they are **cumulative**. Although students tend to dislike

cumulative exams, cumulative exams actually **benefit** students and **promote learning**. Cumulative exams allow students (1) to learn from their mistakes, (2) to demonstrate improvement in understanding and (3) to be rewarded for this improvement. Memorization is static and discrete; learning is dynamic and continuous. Cumulative exams assess and reward learning rather than mere memorization.

Mini Philosophy in Life Papers

With an eye to helping you develop a disposition for finding the philosophical in the familiar, you will write 5 “mini” philosophy in life papers. In each paper, you will describe an experience you have during this course that pertains to course material (e.g., watching an interesting movie, having a discussion with friends or family, having an “ah ha” moment) and analyze it in terms of the concepts you have learned in the course. These papers can take many forms (e.g., Compare/Contrast Theories, Use your experience to argue against a theory, etc.). They should be no more than 1 typed page.

These assignments are meant to give you a chance to demonstrate what you’re learning in this course. The later papers will be worth more than the earlier papers. This gives you a chance to get a sense of what I’m looking for and to improve by taking my comments into account. **Hold on to returned papers. You will submit all of your papers at the end of the semester, so I can track your improvement.**

Attendance & Engagement

Regular attendance is necessary but not sufficient for receiving full credit. You should come to class having done and ready to discuss the assigned readings. If you have questions about the readings, feel free to email me or ask in class.

I think of a college class like a team. I’m the coach or the captain, but we’re all members of the team trying to achieve the same goal: critical engagement with the course material. As with other teams, we must all do our part; if any of us regularly fails to do his/her part, the whole team suffers. You expect me to come to class every day prepared to teach; likewise I expect you to come to class every day prepared to learn. As members of this class, we owe each other the fulfillment of these expectations. Sometimes you will need motivation and I will provide it. If I am failing to meet your expectations, please tell me (respectfully). If you are not willing to do your part, you should not take this course.

To help you do your part I have an attendance policy. You are allowed three free absences. After three free absences, each unexcused absence will deduct .5% from your grade. After each exam I will email you letting you know (1) how many total absences you have and (2) my impression of your participation and engagement in the class. (2) is especially important because I weigh improvement heavily here.

Schedule

Unit 1: General Philosophy of Science

Week 1: Science and Philosophy

PSNI Ch.1

Week 2-3: The Analytic Project

PSNI Ch. 2

Hempel, "Empiricist Criteria of Cognitive Significance"

Popper, "Conjectures and Refutations"

Recommended: Hempel, "Studies in the Logic of Confirmation"

Week 4: The View from the Sciences

PSNI Ch. 3

Putnam & Oppenheim, "The Unity of Science as a Working Hypothesis"

Hume, "Of the Idea of Necessary Connexion"

Week 5-6: Science, History, and Society

PSNI Ch. 4

Kuhn, "The Nature of Normal Science," "Anomaly and the Emergence of Scientific Discoveries," "The Nature and Necessity of Scientific Revolutions"

Week 7: Critical Voices

PSNI Ch. 5

Steele, Selections from *Whistling Vivaldi*

Week 8: Science, Values, and Politics

PSNI Ch. 6

Longino, Selections from *The Fate of Knowledge*

Unit 2: Philosophy of Biology

Week 9: What is Evolutionary Theory?

PB Ch. 1

Week 10: Creationism

PB Ch. 2

Week 11: Fitness

PB Ch. 3

Week 12: The Units of Selection Problem

PB Ch. 4

Week 13: Adaptationism

PB Ch. 5

Week 14: Systematics

PB Ch. 6