

Philosophy 110 Philosophy of Science

Fall Semester

MWF 1:25-2:15

117 Sackett

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If at any point in the semester you feel you are getting behind or are losing your connection with the readings and class discussion, please come see me during office hours or by appointment.

Course Description: This course will examine leading ideas in twentieth century biology and physics, in order to gain a better sense of scientific rationality. How do scientists decide on rules and principles? How do they bring principles and empirical evidence into relation? How do they bring the microscopic world of molecules or wave functions into relation with the macroscopic world of the laboratory, city, field and forest? What is the point of science? We will review the standard mid-century view of scientific rationality put forward by logical positivist philosophers, and think about how it is challenged by new discoveries and the practices of twentieth century scientists.

Course Objectives:

- To learn about some leading ideas in twentieth century biology and cosmology
- To learn what standard Anglo-American mid-twentieth century philosophy of science looked like, and why it looked that way
- To understand what “theory reduction” is, how it is used in science and how it may be misunderstood
- To discern some of the important differences between the physical sciences and the life sciences are, from the perspective of a philosopher
- To think about the ethical and political dimensions of scientific practice as well as philosophical debates
- To end with a more comprehensive sense of scientific rationality, and indeed reason in general

Requirements: Attendance and class participation are mandatory and will account for 10% of the grade: every student counts. Every student in the class will be assigned one class session where he or she will be responsible for the discussion, along with the professor. As we finish each of the five books, students will write a short (2-3 pp.) take-home essay that answers a question raised in class discussion, using the scientific and philosophical terms developed during the previous weeks; these papers will account for 60% of the grade. The two midterm exams and the final exam will be one hour each (short answer format), and will count for 10% of the grade each. Instead of taking these three short exams, students may choose to write a term paper of 10-12 pages; honors students must choose the latter in consultation with the professor. These students will choose a topic in late October and present a 6 page draft of the final paper to the professor before the Thanksgiving Holiday. Attendance on Sept. 19 and 20 is required (see below).

Policies:

Non-Discrimination Statement: The Pennsylvania State University is committed to the policy that all persons shall have equal access to programs, facilities, admission, and employment without regard to personal characteristics not related to ability, performance, or qualifications as determined by University policy or by state or federal authorities. It is the policy of the University to maintain an academic and work environment free of discrimination, including harassment. The Pennsylvania State University prohibits discrimination and harassment against any person because of age, ancestry, color, disability or handicap, national origin, race, religious creed, sex, sexual orientation, or veteran status. Discrimination or harassment against faculty, staff or students will not be tolerated at The Pennsylvania State University. Direct all inquiries regarding the nondiscrimination policy to the Affirmative Action Director, The Pennsylvania State University, 328 Boucke Building, University Park, PA. 16802-2801, Tel (814) 865-4700/V, (814) 863-1150/TTY.

Academic Integrity: Definition and expectations: Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at the Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts. Academic integrity includes a commitment not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others. To protect the rights and maintain the trust of honest students and support appropriate behavior, faculty and administrators should regularly communicate high standards of integrity and reinforce them by taking reasonable steps to anticipate and deter acts of dishonesty in all assignments. At the beginning of each course, the instructor must provide students with a statement clarifying the application of University and College academic integrity policies to that course.

Required Texts:

Evelyn Fox Keller, *The Century of the Gene* (Harvard University Press, 2000)
Stephen Hawking and Roger Penrose, *The Nature of Space and Time* (Princeton University Press, 2000)
Samir Okasha, *Philosophy of Science: A Very Short Introduction* (Oxford University Press, 2002)
Richard Lewontin, *The Triple Helix* (Harvard University Press, 2000)
Stephen Jay Gould, *The Mismeasure of Man* (W. W. Norton & Co., 1996)

Schedule of Classes:

Aug. 25 Introduction and Introductory Questionnaire
27 Keller, *The Century of the Gene*, Introduction
29 Keller, Ch. 1 (first half)

Labor Day

Sept. 3 Keller, Ch. 1 (second half)
5 Keller, Ch. 2 (first half)
8 Keller, Ch. 2 (second half). **Take-home essay 1.**
10 Keller, Ch. 3 (first half)
12 Keller, Ch. 3 (second half)
15 Keller, Ch. 4 (first half)
17 Keller, Ch. 4 (second half). **Take-home essay 2.**
19 & 20 Keller, Conclusion. Evelyn Fox Keller visits campus; lectures at 3:35-6:00 Friday and 10-12 Saturday (locations to be announced); attendance is required for both events.

Sept.	22	Okasha, <i>Philosophy of Science</i> , Ch. 1
	24	Okasha, Ch. 2
	26	Okasha, Ch. 2; handout on formal logic
	29	Okasha, Ch. 3
Oct.	01	Okasha, Ch. 4
	03	Okasha, Ch. 5. Take-home essay 3.
	06	Okasha, Ch. 6
	08	Okasha, Ch. 7
	10	First Midterm Exam.
	13	Lewontin, <i>The Triple Helix</i> , Ch. 1
	15	Lewontin, Ch. 1
	17	Lewontin, Ch. 2
	20	Lewontin, Ch. 2
	22	Lewontin, Ch. 3
	24	Lewontin, Ch. 3. Take-home essay 4.
	27	Lewontin, Ch. 4
	29	Lewontin, Ch. 4
	31	Gould, <i>The Mismeasure of Man</i> , Introduction
Nov.	03	Gould, Ch. 5, 176-201
	05	Gould, Ch. 5, 201-222
	07	Gould, Ch. 5, 222-244. Take-home essay 5.
	10	Gould, Ch. 5, 244-263.
	12	Gould, Ch. 6, 264-285
	14	Gould, Ch. 6, 286-302

- 17 Gould, Ch. 6, 303-332
- 19 Gould, Ch. 6, 332-350, Conclusion
- 21 **Second Midterm Exam.**

Thanksgiving Holiday

- Dec. 01 Hawking and Penrose, Ch. 1
- 03 Hawking and Penrose, Ch. 2 and 4
- 05 Hawking and Penrose, Ch. 3 and 5
- 08 Hawking and Penrose, Ch. 6. **Take-home essay 6.**
- 10 Hawking and Penrose. Ch. 7.
- 12 Final discussion.

Final exam week. **Final Exam; final term paper, if selected, due.**