

A

Philosophy of Science

Spring

Room 200

Tu/Thurs 1:00 - 2:50

Prof: Jordan Smith

Office: RH 201D

Office hours: Wed 12:00 – 3:00pm

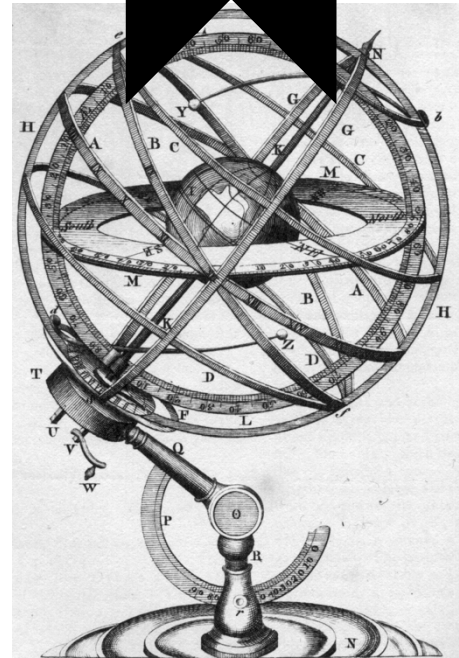
Office phone: 123-123-1234

Course Materials

Jennifer McErlean, *Philosophies of Science: From Foundations to Contemporary Issues* (Belmont, CA: Wadsworth/Thomson Learning, 2000).

Gillian Barker and Philip Kitcher, *Philosophy of Science: A New Introduction* (Oxford: Oxford University Press, 2014).

Other readings and videos – Posted on Canvas.



Course Objectives

The objective of this course is to provide an overview of the main issues in contemporary philosophy of science. These issues include the nature and goals of scientific explanation, the validation of scientific knowledge, the historical development of scientific knowledge, and the ontological import of scientific knowledge. The questions covered under these topics include: "What form do scientific explanations take?", "How do we validate theoretical hypotheses?", "What is the distinction between normal science and revolutionary science?", and "Are the postulated entities of science to be taken as real, existing entities (even when they are unobservable in principle) or, rather, are they (along with the theory of which they form a part) to be taken as instruments for the achievement of certain scientific goals?"

The course will also provide students with an understanding of the activity of philosophy: How philosophers ask questions, how they think about and attempt to answer them, and how they critique the answers given by others as they provide their own alternative answers.

Course Evaluation

Quizzes

There will be regular quizzes based on assigned readings and on class lectures. The purpose of these quizzes is to encourage students to read, study, and identify any areas in which further reading study is required.

The average of these quizzes will be worth 1/6 (16.66%) of the class grade, and student will receive

a '0' for each quiz that is missed.

The quiz dates are listed in the 'Course Outline', which begins on p. 8 of this syllabus, along with the material covered by each quiz.

Quizzes may be administered either at the beginning or end of class. Students are, therefore, strongly advised not to be absent, not to be late for class, and not to leave class early.

Section Exams

In addition to the above, there will be an exam after each major segment that is covered, for a total of four (4) semester exams. These exams may be a combination of multiple choice/true-false, short answer, and/or essays questions. These exams will each be worth 1/6 (16.67%) of the class grade.

Study guides for each of the exams (including the final exam) will be posted on Canvas, in an appropriately labeled folder. The study guides will list the concepts and ideas for which students will be responsible on the exams. Students are advised to also use the study guides when reading the assigned materials and when reviewing class notes.

The exams dates are listed in the 'Course Outline', which begins on p. 8 of this syllabus. Students should make sure that they are present for the exams, since they will receive a '0' for each missed exam.

Final Exam

Finally, there will be a cumulative final exam. The final exam will also be worth 1/6 (16.66%) of the class grade. The final exam will be entirely multiple choice/true-false.

Course Policies

Grading Policy

Quiz Average: 16.66%

Exam #1: 16.67%

Exam #2: 16.67%

Exam #3: 16.67%

Exam #4: 16.67%

Final Exam: 16.66%

Generic University Academic Integrity Policy

Students, staff, and faculty at Generic University are expected to maintain the highest ethical standards. Academic dishonesty, including cheating and plagiarism, is a serious breach of ethical standards. It interferes with the University's mission to provide high quality education and research. It also violates the University's mission to ensure that no student has an unfair advantage over any other student. Academic dishonesty is also destructive of the Generic University's community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see generic.edu/honorcode

Contacting the instructor

If you would like to contact me outside of class or office hours, call my office and leave a message. I will address your question, if applicable, in the following class or in office hours, if applicable.

Course Schedule

Abbreviations

PS = Jennifer McErlean, *Philosophies of Science: From Foundations to Contemporary Issues*.

PSI = Gillian Barker and Philip Kitcher, *Philosophy of Science: A New Introduction*.

CTE = "From Copernicus to Einstein" folder (Canvas, in "Readings" folder, under "Content").

R = "Readings" folder (Canvas, under "Content").

V = "Videos" folder (Canvas, under "Content").

PART I - Positivism, the Analytic Project, and the Standard View of Science

Lecture 1

Reading:

1. Jennifer McErlean, "Introduction: A Note to Students" (PS, pp. 1-6).
2. Jennifer McErlean, "Chapter 1: The Standard View" (PS, pp. 7-27).
3. Gillian Barker and Philip Kitcher, "Preface" and "Chapter 1: Science and Philosophy" (PSI, pp. ix-11).

Video: "Two Statues: An Introduction to the Philosophy of Science" (V).

Lecture 2

Quiz #1 – Readings 1, 2, 3 and lecture notes.

Reading:

4. Rudolph Carnap, "Theoretical Laws and Theoretical Concepts" (PS, pp. 35-46).
5. Gillian Barker and Philip Kitcher, "The Analytic Project" (PSI, pp. 12-49).

Video:

"A Brief History of Science: Antiquity to the Late Middle Ages" (V).

"The Rise of Logical Positivism" (V)

Lecture 3

Reading:

6. Karl Popper, "Truth, Rationality, and the Growth of Scientific Knowledge" (PS, pp. 47-56).

Video:

“A Brief History of Science: Renaissance to the Copernican Revolution” (V).

“The Fall of Logical Positivism” (V).

Lecture 4

Quiz #2 – Readings 4, 5, 6 and lecture notes.

Reading:

7. Carl Hempel and Paul Oppenheim, “Studies in the Logic of Explanation” (PS, pp. 57-67).

Video:

“A Brief History of Science: The Copernican Revolution to the Darwinian Synthesis” (V).

“Classical Empiricism and Logical Positivism” (V).

Recommended Reading:

Hans Reichenbach, “The Copernican View of the World” (CTE).

Hans Reichenbach, “Ether” (CTE).

Lecture 5

Reading:

8. Hans Reichenbach, “The Laws of Nature” (PS, pp. 68-71).

Recommended Reading:

Hans Reichenbach, “The Special Theory of Relativity” (CTE)

Hans Reichenbach, “The Relativity of Motion” (CTE)

Video: “How Does Science Work? Three Views” (V).

Lecture 6

Quiz #3 – Readings 7 and 8 and lecture notes.

Reading:

9. Ernest Nagel, “The Instrumentalist View of Theories” (PS, pp. 88-97).

Recommended Reading:

Hans Reichenbach, “The General Theory of Relativity” (CTE).

Hans Reichenbach, “Space and Time” (CTE).

Exam #1

PART II - Scientific Revolutions, Paradigm Shifts, and Progress Without Truth

Lecture 7

Reading:

10. Jennifer McErlean, "Chapter 2: Reactions to the Standard View" (PS, pp. 98-114).
11. Norwood Russell Hanson, "Observation" (PS, pp. 129-137).

Lecture 8

Reading:

12. Andy Pickering, "Against Putting the Phenomena First: The Discovery of the Weak Neutral Current" (R).
13. Mi Gyung Kim, "The 'Instrumental' Reality of Phlogiston" (R).
14. Meinard Kuhlmann, "What is Real?" (from Scientific American, August 2013) (R).

Video: "Particles, Fields, and the Future of Physics", Sean Carroll (California Institute of Technology) (V).

Lecture 9

Quiz #4 – Readings 10, 11, 12, 13 and lecture notes.

Reading:

15. Thomas Kuhn, "Paradigms" (PS, pp. 159-165).
16. Richard Bernstein, "Scientific Revolutions and Incommensurability" (PS, 166-174).
17. Gillian Barker and Philip Kitcher, "Chapter 4: Science, History, and Society" (PSI, pp. 78-105).

Lecture 10

Reading:

18. Nancy Cartwright, "The Truth Doesn't Explain Much" (PS, 175-179).
19. Ronald Giere, "The Skeptical Perspective: Science Without Laws of Nature" (PS, 180-188).
20. Reiner Hedrich, "Superstring Theory and Empirical Testability" (R).

Recommended Reading:

Paul K. Feyerabend, "Galileo and the Tyranny of Truth", from *Farewell to Reason*, pp. 247-264 (R).

Lecture 11

Quiz #5 – Readings 14 through 19 and lecture notes.

Reading:

21. Ian Hacking, “Experimentation and Scientific Realism” (PS, 189-200).
22. Jeffrey A. Barrett, “Toward a Pragmatic Account of Scientific Knowledge” (R).

Recommended Reading:

Paul K. Feyerabend, “Chapter Five from Against Method” (R).

Exam #2

PART III - Reductionism and the Unity of Science: Alternative Views

Lecture 12

Reading:

23. Jennifer McErlean, “Chapter 7: Unity and Reduction” (PS, pp. 456-469).
24. Carl Hempel, “Theoretical Reduction” (PS, pp. 470-475).
25. Gillian Barker and Philip Kitcher, “The View From the Sciences” (PSI, pp. 50-77).

Lecture 13

Reading:

26. Paul Churchland, “Matter and Consciousness” (PS, pp. 485-492).
27. Jaegwon Kim, “‘Downward Causation’ in Emergentism and Nonreductive Physicalism” (PS, pp. 502-510).

Lecture 15

Quiz #6 – Readings 22 through 27 and lecture notes.

Reading:

28. Larry Wright, “The Case Against Teleological Reductionism” (PS, pp. 493-501).
29. Marina Banchetti and Jean-Pierre Llored, “Reality Without Reification: Philosophy of Chemistry’s Contribution to Philosophy of Mind” (R).

Lecture 16

Reading:

30. David Newth and John Finnigan, “Emergence and Self-Organization in Chemistry and Biology, from The Australian Journal of Chemistry 2006, pp. 841-848 (R).

31. Brian G. Henning, “Swarms, Colonies, Flocks, and Schools: Exploring the Ontology of Collective Individuals”, from *Metanexus Magazine* 2009 (R).

Video: “Causality and Complexity”, Derek Raine (Copernicus Center) (V).

Recommended Reading:

Brian G. Henning, “The Ontology of Collective Individuals and the Process Turn” (R).

Lecture 17

Quiz #7 – Readings 28 through 32 and lecture notes.

Reading:

32. Patrick Suppes, “The Plurality of Science” (PS, pp. 476-484).

33. Stephen Kellert, “In the Wake of Chaos” (PS, pp. 511-526).

Video: “Scientific Pluralism and the Mission of History and Philosophy of Science”, Hasok Chang (Cambridge University) (V) – Lecture begins at the 13:40 minute mark.

Exam #3

PART IV - Science, Values, and Politics: Cultural and Critical Dimensions

Lecture 18

Reading:

34. Jennifer McErlean, “Chapter 5: Narrative and Metaphor” (PS, pp. 323-333).

35. Mary Hesse, “The Explanatory Function of Metaphor” (PS, pp. 349-354).

Lecture 19

Reading:

36. Roald Hoffmann, “Molecular Beauty” (PS, pp. 334-340).

37. Rom Harré, “Some Narrative Conventions of Scientific Discourse” (PS, pp. 369-377).

Video: “Poetic Naturalism”, Sean Carroll (California Institute of Technology) (V).

Lecture 20

Quiz #8 – Readings 33 through 36 and lecture notes.

Reading:

38. Jennifer McErlean, “Chapter 3: Cultural Critique” (PS, pp. 201-210).

39. Leslie Stevenson, “Is Scientific Research Value-Neutral?” (PS, pp. 211-215).
40. Gillian Barker and Philip Kitcher, “Science, Values, and Politics” (PSI, pp. 136-164).

Lecture 21

Reading:

41. Edward Wilson, “Human Decency is Animal” (PS, pp. 216-222).
42. R.C., Lewontin, Steven Rose, and Leon Kamin, “Not in Our Genes” (PS, pp. 223-232).

Lecture 22

Reading:

43. Jennifer McErlean, “Chapter 4: The Social Sciences” (PS, pp. 252-262).
44. Fritz Machlup, “Are the Social Sciences Really Inferior?” (PS, pp. 263-275).

Lecture 23

Quiz #9 – Readings 37 through 43 and lecture notes.

Reading:

45. Robert Kuttner, “The Poverty of Economics” (PS, pp. 276-285).
46. Paul Feyerabend, “How to Defend Society Against Science” (R).

Lecture 24

Reading:

47. Jennifer McErlean, “Chapter 6: Feminist Dimensions” (PS, pp. 378-387).
48. Ruth Hubbard, “Science, Facts, and Feminism” (PS, pp. 388-393).
49. Gillian Barker and Philip Kitcher, “Critical Voices” (PSI, pp. 106-135).

Lecture 25

Quiz #10 – Readings 44 through 48 and lecture notes.

Reading:

50. Sandra Harding, “Feminist Justificatory Strategies” (PS, pp. 427-434).
51. Cassandra Pinnick, “Feminist Epistemology: Implications for Philosophy of Science” (PS, pp. 435-442).

Exam #4

Week 16 – Final Exam (Cumulative)

Course Glossary

A Posteriori Knowledge: Knowledge that is acquired with the aid of sense experience or observation.

A Posteriori Propositions: Propositions that are derivable from and are known to be true through sense experience or observation.

[Redacted from to save time, money, and paper. This syllabus's glossary is more than 4 pages.]

Synthetic Propositions: Propositions, such as "The house is far away", in which the information contained in the predicate term is not fully contained within the subject term. In synthetic propositions, therefore, the predicate contains information that is not implied in the subject. Synthetic propositions can be either true or false.