

Philosophy of Science

PHIL 241, MW 12:00-1:15

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Office hours: MR 10:00-11:00 and by appointment

Course Description

In this course we will first examine the nature of science and what we can reliably come to know about the world through the practice of science. Is science rational? Is it progressive? Are its claims to be regarded merely as useful heuristic devices, or claims about the way the world really is? These are questions we will examine in this course.

We will first look briefly at the history of scientific theorizing up through the scientific revolution of the 16th and 17th centuries. This history is helpful for two reasons: first, it helps us understand the causes leading up to the scientific revolution; second, it provides an in-depth understanding of the history of science, as a constantly changing, temporally bound, human endeavor. We will then turn to logical positivism (the “received view”), a view not just of science but of language generally as *only* meaningful if subject to empirical verification. This view dominated the philosophy of science in the first half of the 20th century, but was definitively refuted in the years following. We will look at critiques of logical positivism and the aftermath in recent philosophy of science, particularly in debates regarding scientific objectivity, the rationality of theory change, the nature of scientific explanation, and scientific realism and anti-realism.

Readings

Nearly all readings will be from *Philosophy of Science: An Historical Anthology* edited by McGrew, Alspector-Kelly, and Allhoff (Wiley-Blackwell, 2009). I ask that you purchase this book and bring it to class with you. Other readings will be handed out or sent to you as a pdf to print. *No laptops or other devices are allowed out in class.*

I expect you to understand the readings, and when you do not understand them, to come to understand them through discussion with me or your classmates. I am always available during office hours, as well as by appointment, if you would like to discuss anything. (A tip: if you are having trouble with a particular reading, the editors provide a summary at the beginning of each unit in the textbook. These summaries can be helpful, especially when preparing your presentation).

Assignments

Your grade will be based on two class presentations (10% each), a midterm paper (25%), participation in class discussion and in online moodle forum (15%) and a final paper (40%). All grading in class will be done with letter grades, figured on a four point scale (A=4.0, A-=3.67, B+=3.33, etc.). You will not pass the class if you fail to turn in a major assignment.

Papers (65% of final grade; 25% midterm paper and 40% final paper)

You will write one shorter midterm paper (5-6 pages long) and one longer final paper (8-10 pages long). You will both email me your paper *by noon on the day it is due* AND bring a hard copy with you to class. I will give prompts for the first (shorter) paper, but for the final paper, I expect you to come up with the topic. I will give you a deadline for a paper prospectus in the weeks leading up to the end of the semester.

Presentations (20% of final grade)

Twice in the course of the semester, you will present on the readings which are due that day. The presentation should consist of a summary of the readings and questions for discussion. They may also include critiques or defenses of the positions expressed in the readings. I expect the presentations to last 10 to 15 minutes, and to include a handout for me and your fellow students (you may email me the handout to print beforehand, if you prefer).

Moodle Forum/Participation (15% of final grade)

There is a forum for this class when you sign onto Moodle. Every day when reading is due, you must participate in this forum in some way by noon. Your participation must demonstrate that you have done the reading. I will also be active on this forum, responding to your questions or comments if I think it will be helpful. You are required to come to class and participate in class discussions. At the end of the semester, I will count up absences and missed moodle forum comments, and taking into account your participation in class, I will assign you a grade. It is okay to miss once or twice. But consistent lateness/absence or sporadic participation in moodle will result in a low participation grade.

Academic Integrity

Violations of academic integrity will not be tolerated. There are many ways to violate the academic integrity, and you are responsible to know what counts as a violation of academic integrity. If you have any doubt, send me an email and I will let you know. Plagiarism can take many forms, but the most common are as follows: using another author's idea in your paper without citation, paraphrasing someone else's work without citation, inserting phrases from another person's work without quotation marks, and extensive collaboration with other students. While discussing the ideas in your paper with other students is worthwhile and I would encourage you to do this, you must write your paper on your own. When in doubt, just add a footnote, don't worry so much about the format of it: "I got this idea from Bill's comment on the forum on 3/2" is fine. Most forms of plagiarism can be avoided by simply not consulting any material for your paper except those required for the course. Do not consult sources that originate on the internet (e.g. wikipedia, blogs). For more information visit: <https://www2.clarku.edu/offices/aac/integrity.cfm>

Schedule

Below is a schedule of the core readings. My primary method of communication with you (apart from in class) will be via email. I reserve the right to change this schedule. If there is a significant change to this schedule, I will send out the revised schedule via email.

(NB: While some days look very heavy on the reading, some of the readings are excerpts and are quite short, i.e., a page or two).

Wednesday 1/18:

Opening discussion/Syllabus

Unit 1: Ancient and Medieval Periods

Monday 1/23

Democritus	1.1 “Atoms and Empty Space” (from Diogenes Laertius)
Epicurus	1.2 “Letter to Herodotus”
Zeno	1.3 “The Paradoxes of Motion”
Aristotle	1.6 “Changes, Natures, and Causes”
Aristotle	1.9 “The Divisions of Nature and the Divisions of Knowledge”

Wednesday 1/25

Lucretius	1.11 “The Explanatory Power of Atomism”
Ptolemy	1.12 “The Earth: Its Size, Shape, and Immobility”
Philoponus	1.14 “Projectile Motion”
Maimonides	1.16 “Against the Reality of Epicycles and Eccentricities”

Unit 2: The Scientific Revolution

Monday 1/30: Cosmology

Copernicus	2.3 “The Motion of the Earth”
Kepler	2.5 “A Man Ahead of His Time”
Kepler	2.6 “On Arguments about a Moving Earth”
Galileo	2.11 “The Copernican View Vindicated”
Newton	2.18 “The System of the World”

Wednesday 2/1: Corpuscles, Induction, Newton

Boyle	2.12 “The ‘Corpuscular’ Philosophy”
Huygens	2.13 “Successful Hypotheses and High Probability”
Newton	2.14 “Inductive Methodology”
Newton	2.16 “Four Rules of Reasoning”
Newton	2.17 “General Scholium”

Unit 3: The Modern Philosophers

Monday 2/6

Bacon	3.1 “The Inductive Method”
Descartes	3.2 “Rules for the Discovery of Scientific Truth”
Descartes	3.3 “Rationalism and the Scientific Method”

Wednesday 2/8

Hume	3.7 “The Problem of Induction”
Hume	3.8 “The Nature of Cause and Effect”

Unit 4: Methodology and Revolution

Monday 2/13

- Herschel 4.3 “Hypotheses, Data, and Crucial Experiments”
Mill 4.4 “An Empiricist Account of Scientific Discovery”
Whewell 4.5 “Against Pure Empiricism”
Whewell 4.6 “The Causes Behind the Phenomena”
Darwin 4.9 “The Explanatory Scope of the Evolutionary Hypothesis”

Wednesday 2/15

- Peirce 4.10 “Induction as a Self-Correcting Process”
Peirce 4.11 “The Nature of Abduction”
Poincaré 4.12 “The Role of Hypotheses in Physical Theories”
Duhem 4.13 “Against Crucial Experiments”
Einstein 4.14 “On the Method of Theoretical Physics”

Unit 5: The Received View

Monday 2/20

- Carnap 5.1 “Theory and Observation”
Hempel 5.2 “Scientific Explanation”

Wednesday 2/22

- Carnap 5.3 “Empiricism, Semantics, and Ontology”
Reichenbach 5.4 “The Pragmatic Vindication of Induction”

Unit 6: After the Received View: Confirmation and Observations

Monday 2/27

- Hempel 6.1 “Empiricist Criteria of Cognitive Significance: Problems and Changes”
Hempel 6.2 “The Raven Paradox”

Wednesday 3/1

- Quine 6.3 “Two Dogmas of Empiricism”

***** 3/6-3/10 SPRING BREAK*****

Monday 3/13

- Popper 7.1 “Science: Conjectures and Refutations”
Goodman 6.4 “The New Riddle of Induction”

Wednesday 3/15

- Putnam 6.5 “What Theories are Not”
Hanson 6.6 “On Observation”

Unit 7: Methodology, Objectivity, and Rationality

Monday 3/20

- Kuhn 7.2 “The Structure of Scientific Revolutions”
Kuhn “Objectivity, Value Judgment, and Theory Choice” (handout)

Wednesday 3/22

- McMullin “Rationality and Paradigm Change in Science” (handout)
Lakatos 7.3 “Science and Pseudoscience”

Monday 3/27

Longino “Values and Objectivity” (handout)
Sarewitz “Saving Science” (online reading—no need to print)

Wednesday 3/29

MacIntyre “Epistemological Crises, Dramatic Narrative, and the Phil. of Science” (handout)

Unit Σ: The Realism Debate

Monday 4/3

Boyd 9.1 “The Current Status of Scientific Realism”

Wednesday 4/5

Laudan 9.2 “A Confutation of Convergent Realism”

Monday 4/10

Van Fraassen 9.3 “Constructive Empiricism”
Maxwell 6.7 “The Ontological Status of Theoretical Entities”

Wednesday 4/12

Fine 9.4 “The Natural Ontological Attitude”

Unit Δ: Explanation

Monday 4/17

Salmon 8.1 “Counterexamples to the D-N and I-S Models of Explanation”
Salmon 8.2 “The Statistical Relevance Model of Explanation”

Wednesday 4/19

Salmon 8.3 “Why Ask, ‘Why?’”
Kitcher 8.4 “Explanatory Unification”

Unit Ω: Science and Society/Paper topic presentations

Monday 4/24

TBD

Wednesday 4/26

TBD

Monday 5/1

TBD