PHIL 12: PHILOSOPHY OF SCIENCE

Foothill College Course Outline of Record

Heading	Value
Units:	4
Hours:	4 lecture per week (48 total per quarter)
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Area I: Humanities
Transferable:	CSU/UC
Grade Type:	Letter Grade (Request for Pass/No Pass)
Repeatability:	Not Repeatable

Student Learning Outcomes

- Identify significant theories regarding the epistemic nature of science as presented by major philosophers in the field (ex. Hume, Popper, Kuhn, Lakatos etc.)
- Explain and evaluate important arguments in the philosophy of science.

Description

An investigation of major philosophical issues and problems regarding the nature of science, its importance and its implications for human understanding. In particular, the course will investigate the how scientific knowledge is constructed and how that knowledge influences our contemporary view of reality. Major issues in the course will include how science can be defined and demarcated from pseudoscience (astrology, creationism, new age spiritualism etc.), the concept of paradigms and paradigm shifts in the history of science, the role of inductive reasoning in science and its potential problems, and the importance of falsificationism in the development of scientific theory.

Course Objectives

The student will be able to:
A. Clearly articulate and apply strategies for demarcation of science from non-scientific and pseudo-scientific modes of inquiry.
B. Identify a variety of theories and criteria for a field of inquiry to have scientific status and their benefits and drawbacks.
C. Critically discuss historical and contemporary theories regarding philosophy of science and the major thinkers who develop those theories.
D. Analyze various concepts and controversies in the philosophy of science.
E. Develop arguments regarding the various concerns in philosophy of science.

Course Content

A. The historical background to contemporary philosophy of science: the scientific revolution.
1. The influence of Aristotelian natural philosophy and the European intellectual climate leading up to the "scientific revolution."
2. Significance and influence of the Copernican revolution in astronomy.
3. The search for a new method of generating knowledge of the natural world.
a. Francis Bacon.
b. Rene Descartes.
c. Isaac Newton.
B. The problem of demarcation.
1. Possible definitions and criteria for demarcation, their benefits and drawbacks.
2. Case studies for demarcation: science vs. pseudoscience.
a. Astrology.
b. Creationism.
c. New age integration of scientific ideas with speculation, spirituality and religion.
C. Attempts to identify necessary and sufficient conditions for identifying a field of inquiry as scientific.
1. Bacon's simple inductivism.
2. Hume and the the problem of induction.
a. Humes's skeptical argument concerning induction.
b. Induction and laws of causation.
c. Induction and explanation.
d. Responses to the problem of induction.
D. Karl Popper's non-inductivist method.
1. Popper and falsificationism.
a. Popper's solution to the problem of induction.
b. Falsifiability as a criterion for scientific status.
c. Fallibilism and critical rationalism.
2. Scientific discovery versus justification.
3. The nature of the Duhem problem and the possible implications for Poppers theory.
E. Thomas Kuhn and the structure of scientific revolutions.
1. The concept of scientific paradigms as a set of assumptions and methods that govern a field of scientific inquiry.
a. Anomaly and the idea of science being occupied with “mop-up” work.
b. Reconciling anomalies to the paradigm.
c. Competing paradigms.
d. Scientific revolutions and paradigm shifts.
e. Alleged examples of scientific revolutions.
2. Theory–laden nature of observation.
3. Problem of relativism in Kuhn's theory of scientific method.
F. Other theories of the scientific method.
1. Lakatos' attempt to retain essential features of Popper's theory while building upon Kuhn in order to reconcile theory with the history of science.
2. Prediction versus explanation.
a. Reasons some philosophers accord special epistemic status to prediction over explanation.
b. Reasons some philosophers accord special epistemic status to explanation over prediction.
G. Scientific realism.
1. Semantic instrumentalism.
2. Reductive empiricism.
3. Logical positivism.
4. Skepticism and the problem of historical change.
a. The problems of theory change for scientific realism.
H. The problem of underdetermination.
1. Strong versus weak underdetermination.
2. Objections to underdetermination.
3. Problem of induction as a form of underdetermination.
4. Underdetermination and the social construction of science.
I. Contemporary antirealism: van Fraassen's constructive empiricism.
1. Alleged epistemological importance of distinctions between observable and unobservable.
J. Recent developments.

Lab Content

Not applicable.

Special Facilities and/or Equipment

When taught as an online distance learning section, students and faculty need ongoing and continuous internet and email access.

Method(s) of Evaluation

A. Written examinations.
B. Multiple choices quizzes.
C. Argumentative essays.
D. Student presentations.

Method(s) of Instruction

A. Lecture.
B. Discussion.
C. Reading of primary and secondary literature.

Representative Text(s) and Other Materials

Curd, Martin and J.A. Cover. Philosophy of Science: The Central Issues. 2nd ed. New York, NY: W.W. Norton, 2012.

Ladyman, James. Understanding Philosophy of Science. New York, NY: Routledge, 2002.

Lange, Marc. Philosophy of Science: An Anthology. Malden, MA: Wiley-Blackwell Publishing, 2007.

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

A. Reading primary sources from relevant philosophers (Aristotle, Bacon, Popper, Duhem, Kuhn, etc.).

B. Argumentative essay (term paper) on issues in philosophy of science (problem of induction, falsification, paradigm shifts, realism-anti-realism, etc.).

C. Examinations including various testing measures including short answer questions and essay.

Discipline(s)

Philosophy.