

PHIL250: Philosophy of Science

(Updated December 3, 2007)

TuTh 12:30-1:45 pm , HZF 0106
University of Maryland, College Park Fall 2007

Instructor: William Michael Kallfelz
Office: SKN 1120C (301)405-5841
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Course Overview

This course offers an overview of some of the central issues in the philosophy of science. Surveying science from an external perspective, this course will explore questions like: (a) How can one distinguish science from pseudo-science? (b) To what degree and extent do values influence what are considered “scientifically objective” theories and facts, and from what basis do we evaluate their objectivity? (c) How does one best characterize the growth and evolution of scientific knowledge? Internal to science, we will also tackle questions like: (d) What does it mean for a scientific theory to be confirmed? (e) What characterizes a “law of nature?” (f) How do scientific theories interrelate and when can one talk about one theory “reducing to” another?

Course Requirements

You are expected to attend class regularly, to carefully study assigned readings, and to complete all assignments:

Term Papers

- First paper due **October 4th, 2007** (25%)
- Second paper due **November 29th, 2007** (25%)

Exams

- Midterm exam: October 18, 2007 (20%)
- Final exam, (30%)

TuTh 12:30	Tuesday, Dec 18	1:30pm-3:30pm
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(Check Testudo <http://www.testudo.umd.edu/soc/examfall.html> for any possible updates or changes)

Your final grade will depend on the percentage you earn of the total points possible in the class: A+: 98-100; A: 94-97; A-: 90-93; B+: 87-89; B: 84-86; B-: 80-83; C+: 77-79; C: 74-76; C-: 70-73; D+: 67-69; D: 64-66; D-: 60-63.

- Assignments submitted late will receive a penalty of one letter grade (10%) per school day late.
- Papers will not be accepted via e-mail.

Absences

If you will be (or have been) absent for an exam or a class in which an assignment is due, you will need to provide a university-approved justification for your absence in order to be allowed to take a make-up exam or quiz, or to hand in the assignment late.

Special Accommodations

- Students with disabilities that require special class or exam accommodations must present a form from Disabilities Services specifying their *as soon as possible*.
- You will not be penalized for any absences due to religious observances. However, it is your responsibility to inform the instructor or teaching assistant in advance of any intended absences for religious observance *as soon as possible*.

Classroom Courtesy

Please be courteous to your fellow students and avoid unnecessary disruptions. Arrive on time, leave on time, and *turn off your cell phone during class*.

Academic Integrity

- The University of Maryland Honor Pledge reads: "I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination." The Pledge statement should be handwritten and signed on the front of your exams and papers. Students who fail to write and sign the Pledge will be asked to confer with the instructor.
- The Student Honor Council identifies four types of academic dishonesty: cheating, fabrication, facilitating academic dishonesty, and plagiarism. It is your responsibility to understand what constitutes dishonesty of these four types. Please consult the Student Honor Council Website:
<http://www.studenthonorcouncil.umd.edu/whatis.html>
If you would like any further clarification, e.g., on what constitutes plagiarism, please speak with the instructor or a teaching assistant.
- Incidents of academic dishonesty are taken very seriously. We will forward to the office of judicial programs any cases of it that come to our attention.

Course Textbook

- J. Cover & M. Curd, eds. (CC 1998) *Philosophy of Science: The Central Issues*, W. W. Norton & Co., 1998. (pbk) (ISBN: 0-393-97175-9)
- Supplementary readings will be posted in the course reserves via the catalog on the McKeldin Library website (www.lib.umd.edu).
- In addition, course notes (.ppt and/or .pdf) will be periodically posted in the course website: <http://www.glue.umd.edu/~wkallfel/PHIL250/index.html>

Class Schedule

- Readings may be subject to change.
- The Assigned Readings are for the topic covered in class on that day, as homework. I will take roughly 10-15minutes to answer questions you may have on the readings in the following class period. If you have further questions, please see me during office hours.

Topic	Date	Assigned Readings
<i>Introduction</i>	08/30/07	Preface & Introduction CC1998
<i>Argument forms relevant to scientific reasoning</i>	09/04/07	(No readings from text) check course website for posted notes
<i>Science and Pseudoscience</i>	09/06/07	<ul style="list-style-type: none"> • Karl Popper, “Conjectures & Refutations” (, pp.3-10 CC1998) • Karl Popper <i>The Logic of Scientific Discovery</i> (excerpts) McK Reserves
	09/11/07	<ul style="list-style-type: none"> • Imre Lakatos “Science and Pseudoscience” (pp.20-26 CC1998) • Paul Thagard “Why Astrology is a Pseudoscience” (pp27-37CC1998) • (optional) Thomas Kuhn “Logic of Discovery or Psychology of Research?” (pp.11-19 CC1998)
	09/13/07	<ul style="list-style-type: none"> • Michael Ruse “Creation Science is Not Science” (pp.38-47 CC1998) • Larry Laudan “Commentary ” (pp.48-53 CC1998) • Michael Ruse “Response to Commentary” (pp.54-61 CC1998) • COMMENTARY pp. 62-82 (CC1998)
	09/18/07	<ul style="list-style-type: none"> • INTRODUCTION pp. 83-85 (CC1998) • Thomas Kuhn “The Nature and Necessity of Scientific Revolutions” (pp.86-101 CC1998)
<i>Objectivity & Values in Science –pt.I: How value-laden are scientific theories and facts?</i>	09/20/07	<ul style="list-style-type: none"> • Thomas Kuhn “Objectivity, Value Judgment and Theory Choice” (pp.102-118 CC1998) • Ernan McMullin “Rationality and Paradigm Change in Science” (pp.119-138 CC1998)
	09/25/07	<ul style="list-style-type: none"> • Helen Longino, “Values and Objectivity” (pp.170-191 CC1998) • Phillip Kitcher, <i>Science and Democracy</i>,

	(excerpts) McK Reserves	
<i>Objectivity & Values in Science –pt.II: What is Scientific Truth?</i>	09/27/07	<ul style="list-style-type: none"> • INTRODUCTION pp. 1049-1052 (CC1998) • Richard Boyd , <i>Images in Science</i>, (excerpts) McK Reserves • Grover Maxwell, “The Ontological Status of Scientific Entities,” pp. 1052-1063 (excerpts, CC1998)
	10/02/07	<ul style="list-style-type: none"> • Bas van Fraasen, “Arguments Concerning Scientific Realism,” pp. 1064-1087 (CC1998) • Alan Musgrave, “Realism versus Constructive Empiricism” pp.1088-1114 (CC1998)
	10/04/07	<ul style="list-style-type: none"> • FIRST PAPER DUE • Ian Hacking, “Experimentation and Scientific Realism,” pp. 1153-1168 (CC1998) • Arthur Fine, “The Natural Ontological Attitude,” pp.1186-1208 (CC1998) • (optional) Alan Musgrave, “NOA’s Ark—Fine for Realism,” pp. 1209-1225 (CC1998)
<i>Growth and Evolution of Scientific Knowledge</i>	10/09/07	<ul style="list-style-type: none"> • Richard Burian, “How Not to Talk About Conceptual Change in Science”, McK • Thomas Kuhn, <i>The Structure of Scientific Revolutions</i>, (excerpts, chptrs. II, III, IV) McK Reserves
	10/11/07	<ul style="list-style-type: none"> • Larry Laudan, <i>Progress and Its Problems</i> (excerpts chptrs 1,2 optional, chptrs 3, 4 req.) McK Reserves • Thomas Kuhn, <i>The Structure of Scientific Revolutions</i>, (excerpts, Chptrs V, VI, VII) McK Reserves • Optional Kevin Elliot, “A Novel Account of Scientific Novelty: Help for the Dispute over Low-Dose Biochemical effects” (pdf) • Lightman & Gingrich, “When Do Anomalies Begin?” (pdf)
	10/16/07	<ul style="list-style-type: none"> • Ronald Giere, <i>Explaining Science: The Cognitive Paradigm</i> (excerpts) McK Reserves • Nancy Nersessian, “Model-Based Reasoning in Conceptual Change,” [PDF]

<i>Confirmation</i>	10/23/07	<ul style="list-style-type: none"> • INTRODUCTION pp. 549-50 (CC1998) • Check course website for Notes on Bayes
	10/25/07	<ul style="list-style-type: none"> • Wesley Salmon , “Rationality and Objectivity in Science: Tom Kuhn Meets Tom Bayes” pp. 551-583 (CC1998)
	10/30/07	<ul style="list-style-type: none"> • Clark Glymour, “Why I am Not a Bayesian,” pp. 584-606 (CC1998) • COMMENTARY (optional) pp. 626-674 CC1998)
<i>Scientific Explanation</i>	11/01/07	<ul style="list-style-type: none"> • INTRODUCTION pp. 675-677 (CC1998) • Rudolf Carnap: “The Value of Laws,” pp. 678-684 • Karl Hempel, “Two Basic Types of Scientific Explanation,” pp. 685-694 (CC1998) • Karl Hempel, “Inductive-Statistical Explanation,” pp. 706-719 (CC1998) • Optional: Karl Hempel, “The Thesis of Structural Identity” pp. 696-705 (CC1998)
	11/06/07	<ul style="list-style-type: none"> • Phillip Kitcher, “Explanatory Unification and the Causal Structure of the World” McK Res required: §§1. – 4. (410-447) • Optional: §§5. – 8. (448-505)
	11/08/07	<ul style="list-style-type: none"> • Peter Achinstein, “Explanation vs. Prediction: Which Carries More Weight?” pp. 481-493 (CC1998) • Margaret Morrison, <i>Unifying Scientific Theories</i> (excerpts) McK Res.
<i>Theory Underdetermination</i>	11/13/07	<ul style="list-style-type: none"> • Donald Gillies “The Duhem Thesis and Quine Thesis” pp. 302-319 (CC1998) • Optional: excerpts from Duhem’s <i>Aim and Structure</i> (CC1998) • Optional: W.V.O. Quine’s “Two Dogmas of Empiricism” (CC1998)
	11/15/07	<ul style="list-style-type: none"> • Larry Laudan, “Demystifying Underdetermination,” pp. 320-353 (CC1998) • COMMENTARY pp. 354-408 (excerpts CC1998)
<i>Laws of Nature</i>	11/2007	<ul style="list-style-type: none"> • INTRODUCTION pp. 805-907 (CC1998)

	<ul style="list-style-type: none"> • A.J. Ayer, “What Is a Law of Nature?” pp.808-825 (CC1998) • Lambert & Britten, “Laws and Conditional Statements,” McK Res • John Carroll, “Laws of Nature” http://plato.stanford.edu/entries/laws-of-nature/ (selection) 		
11/27/07	<ul style="list-style-type: none"> • Cartwright, Nancy, “Do the Laws of Nature State the Facts?” p..865-877 (CC1998) • Guest Lecturer: Luke Conlin, <i>Physics Education Group</i>, Department of Physics, UMCP • Suggested reading: A. Elby & D. Hammer, “On the Substance of a Sophisticated Epistemology” http://www.glue.umd.edu/~wkallfel/PHIL250/physics_education.pdf 		
11/29/07	<ul style="list-style-type: none"> • SECOND PAPER DUE • INTRODUCTION pp. 903-904 (CC1998) • Ernest Nagel, “Issues in the Logic of Reductive Explanations,” pp. 905-921 (CC1998) 		
12/04/07	<ul style="list-style-type: none"> • Thomas Nickles, “Two Concepts of Intertheotic Reduction” pp. 950-970 (CC1998) 		
<i>Intertheoretic Reduction</i>	<table border="0"> <tr> <td>12/06</td> <td> <ul style="list-style-type: none"> • Robert Batterman, “Intertheory Relation in Physics” Optional: § 1 “The Philosopher’s Sense of Reduction” (pp. 1-5¹) Required: §§ 2-8 (pp. 5- 9) http://plato.stanford.edu/entries/physics-interrelate/ • Optional: Phillip Kitcher, “1953 and All That: A Tale of Two Sciences, pp. 971-1003 (CC1998) • Required: Commentary (on Kitcher) pp. 1028-1038 (CC1998) </td> </tr> </table>	12/06	<ul style="list-style-type: none"> • Robert Batterman, “Intertheory Relation in Physics” Optional: § 1 “The Philosopher’s Sense of Reduction” (pp. 1-5¹) Required: §§ 2-8 (pp. 5- 9) http://plato.stanford.edu/entries/physics-interrelate/ • Optional: Phillip Kitcher, “1953 and All That: A Tale of Two Sciences, pp. 971-1003 (CC1998) • Required: Commentary (on Kitcher) pp. 1028-1038 (CC1998)
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Final Exam Review 12/11/07

- **Note: The Content of the Syllabus is liable to change, please check <http://www.glue.umd.edu/~wkallfel/PHIL250/index.html> for updates.**

¹ Your printer may format the article differently with a different page numbering scheme.

The Course of Science

