

PHIL. 4400: Philosophy of Science

Fall, 2006

Class Meets: 3³⁰-4⁴⁵, TR, HLMS 177
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Office: 266 Hellems
Office Hours: TR 12:30-1:45
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General Description

In the first half of the course we will explore the nature of scientific reasoning and knowledge. In the second half, we try to understand what modern science, particularly physics, tells us about reality. Our focus will be on formulating and evaluating rational arguments on puzzling controversial questions. The course will have 4 units:

First unit: The Problem of Induction. Science seems to rely on induction, the practice of inferring that unobserved objects will have similar characteristics as observed objects. Why are we justified in assuming this? We review three responses to this problem.

Second unit: Miscellaneous Epistemological Issues. Why are some philosophers skeptical about scientific objectivity and knowledge? Can we formulate meaningful theories that can't be tested? Why is simplicity a theoretical virtue?

Third unit: Space, Time, & Causality. How does the Special Theory of Relativity bear on the traditional absolute & relational theories of space? Why do some people still defend absolute motion? Can spacetime be "curved", and what does that mean? Finally, what does physics tell us about causality? Must causes precede their effects?

Fourth unit: Quantum Mechanics. We examine the strange experimental results that lead to quantum mechanics, and the mathematical formalism that predicts them. We look at how QM allows for faster-than-light connections (non-locality). Finally, we discuss David Bohm's radical proposal for eliminating most of the paradoxes and weirdness of QM.

Readings

Required: A course packet from the CU Book Store, and David Albert's book *Quantum Mechanics and Experience* (also at the CU Book Store). In case the book store runs out, I've put a copy of the first few readings on electronic reserve (see <http://libraries.colorado.edu/search/p?SEARCH=huemer>).

Course Requirements & Grading

• Reading Quizzes (30% of grade):

At the beginning of each class, I'll give you a few short-answer questions about the readings, which you'll have about 5 minutes to answer.

Note: If you walk in after I've collected the quizzes, then you won't be allowed to take it (and so you'll get *no credit* for that quiz). ☹

Quiz Grading: Basically, you'll get full credit as long as you write down answers that evidence that you did the readings, with a modicum of understanding. You can miss three of these quizzes during the semester without affecting your grade. If you have to miss more than that, you'll have to come up with documentation of your debilitating medical condition that prevents you from attending class.

- **Unit Tests (70% of grade):**

There will be 4 in-class tests, consisting of objective, multiple choice and short answer questions about what the philosophical ideas and arguments discussed in class and the book were.

- *Paper (optional):* If you don't want to take test #4 on the final exam day, you may instead write me a paper. Length: 6-8 pages. Topic: Take some idea that was defended in the readings or the lecture during the semester, and explain why you think it is wrong.

As with many things in the outside world, grades are based on observable performance, rather than effort or virtue. Please do not tell me you should get a higher grade because you tried really hard, or because you really need it.

Also, do not obsess about your grade. After you graduate, no one will ever look at your grades again. You should come here to increase your understanding, not to get a grade.

Who should take this class?

There's only one good reason to take this class. That is because you're interested in the nature of science, and what modern science tells us about reality.

Warnings and requests: Don't take the class if you are unable to regularly make it here on time. Be forewarned that the objective nature of my tests means that if you don't do the readings and come to class, you will be pretty much screwed on the tests. Lastly, if you're a lover of political correctness, if you think a teacher's job is to promote students' "self-esteem", or if you think there's no truth and all beliefs are equal, then you shouldn't take a class from me.

The benefit of the class is that you will (I hope!) gain a greater understanding of modern science, as well as a more philosophical and critical attitude toward what it teaches us.

Other Guidelines

1. To contact me: send email to the address listed above, and I will probably respond the same day. Or call between 10 a.m. and 10 p.m. and leave a message.
2. Feel free come to my office to talk about philosophy, or play chess. If you have any questions, I will do my best to answer them, but you needn't have a specific question to come.
3. During class, please do not hesitate to comment on or ask about anything we discuss. Please feel free to say whatever is on your mind (of a philosophical nature). Discussion is crucial to philosophy.
4. I have a web page <<http://home.earthlink.net/~owl232/>>, which includes some information about the class, including this syllabus & some lecture notes, among other, more interesting things. You may wish to view the philosophy humor.

Schedule

This lists what you should read for the class discussion on each day. Also note the **test dates**. The readings for Units 1-3 are from the course packet. The author and the starting page number of the reading is listed for each day. Some days have more than one reading. The readings for Unit 4 are from Dave Albert's book.

Unit 1 The Problem of Induction	
T, Aug. 29	Problem of Induction. Russell (1)
R, Aug. 31	Falsificationism. Popper (6), Stove (12)
T, Sept. 5	Inference to the best explanation. Foster (14)
R, Sept. 7	More inference to the best explanation.
T, Sept. 12	Probability. Howson & Urbach (22)
R, Sept. 14	Probability & Induction (a Bayesian view). Stove (28)
T, Sept. 19	More Bayesianism.
R, Sept. 21	Test #1.
Unit 2 Misc. Epistemological Topics	
T, Sept. 26	Irrationalist philosophy of science. Stove (39)
R, Sept. 28	More Irrationalism.
T, Oct. 3	Positivism. Ayer (49)
R, Oct. 5	Positivism. Passmore (56), read "PROBLEMS OF POSITIVISM"
T, Oct. 10	Rationalism. Russell (62)
R, Oct. 12	Simplicity. Huemer (67), sections 2.1-2.5.
T, Oct. 17	More simplicity. Huemer (67), sections 2.6, 3.
R, Oct. 19	Test #2.
Unit 3 Space, Time, & Causality	
T, Oct. 24	Absolute space. Newton (88)
R, Oct. 26	Special relativity & positivism. Einstein (96); start Maudlin (100)
T, Oct. 31	Special relativity & spacetime structure. Maudlin (100)
R, Nov. 2	Absolute space, motion, &c. Marklin (119), Tooley (123)
T, Nov. 7	General relativity. Carnap (127)

R, Nov. 9	More general relativity. BonJour (137)
T, Nov. 14	Simultaneous causation. Huemer & Kovitz (141)
R, Nov. 16	Test #3.
T, Nov. 21	<i>No Class—Thanksgiving Break</i>
R, Nov. 23	<i>No Class—Thanksgiving Break</i>
Unit 4 Quantum Mechanics	
T, Nov. 28	The puzzle of quantum mechanics. Albert, ch. 1
R, Nov. 30	The mathematics. Albert, ch. 2, pp. 17-30
T, Dec. 5	More math. Albert, ch. 2, pp. 30-38, 47-50, 53-6
R, Dec. 7	Nonlocality. Albert, ch. 3
T, Dec. 12	Bohm's interpretation. Albert, ch. 7, pp. 135-53
R, Dec. 14	More Bohm. Albert, ch. 7, pp. 153-70
Sat, Dec. 16 4:30	Test #4. <i>(Scheduled 'final exam' period.)</i>

What did I ever do to you?

