Philosophy 128

U.C., Berkeley

Spring 2013

Philosophy of Science

This is a course about the epistemology of science. We will ask what makes something a scientific explanation, and what is required for observations to confirm (support) a hypothesis. We will ask how scientific models, experiments, and computer simulations are similar and different, and how scientists learn from each of these tools. We will pay particular attention to the example of climate models and simulations. Prerequisite: one course in philosophy.

Classes: meet T TH 11-12:30, 200 Wheeler. Classes will be lecture with some discussion.

Professor: S. Roush
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(Please do not expect to reach me by phone or phone message.)
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Office hours: T 10-10:45, TH 1-2, and by appt.

Graduate Student Instructor: Shivaram Lingamneni
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Texts: The main texts for the course are 1) a coursepack available online at http://www.universityreaders.com/students/instructions , and the book *Science in the Age of Computer Simulation*, by Eric Winsberg, which is available at the campus store. Readings are expected to be done before the classes for which they are assigned. Note that you will have quizzes on readings before they are discussed in class. You will be given study questions ahead of time for each week to guide you toward the important issues in the reading.

Assignments: Students in this course will take six quizzes at times that are on the schedule below, and they will write one short paper (3 pp.) and one longer paper (4 pp.). Each student will have his/her quiz with the lowest score dropped. The quizzes will be taken at the beginning of class, on the material we are about to discuss. They are straightforward and designed simply to test whether you've done the reading. The papers will be on the major topics of the course. For each paper you will pick your topic from a sheet of assigned topics. The due dates are below.

Turning in papers: You will turn in your papers to Shivaram via email to an address TBA. Papers are always due at 5pm.

To receive a passing grade in the course you must complete all assignments.

Late Work: Late work burdens the GSI. It will affect your grade in proportion to its inexcuseability, typically two thirds of a letter grade per day (e.g., A- goes to B). Poor time management isn't an excuse.

Grade: Your grade will break down as follows:

> Five quizzes ……………25%
> Paper 1 – due 2/26 ……. 30%
> Paper 2 – due 5/7 ……... 40%
> Participation in section ... 5%

Note that this implies there is *no final exam*.

Course website: This course has a website on bSpace. If you are registered for the course, you should receive announcements when resources are uploaded or announcements posted. You are responsible for all of the information that is announced on bspace (and in class).

Disabilities: Any student who has a disability requiring assistance or accommodation, or for whom I should have emergency medical or other information, should please speak to me in the first weeks of class so that this can be arranged promptly.

Statement on Academic Integrity, Citation, and Plagiarism

Any test, paper or report submitted by you and that bears your name is presumed to be your own original work that has not previously been submitted for credit in another course unless you obtain prior written approval to do so from your professor.

In all of your assignments, including your homework or drafts of papers, you may use words or ideas written by other individuals in publications, web sites, or other sources, but only with proper attribution. "Proper attribution" means that you have fully identified the original source and extent of your use of the words or ideas of others that you reproduce in your work for this course (quotation or paraphrase), usually in the form of a footnote or parenthesis. In this course any style of citation is acceptable as long as it is applied consistently throughout a piece of work. All the bibliographic information for the readings is included in the contents page of the course pack (first page).

As a general rule, if you are citing from a published source or from a web site and the quotation is short (up to a sentence or two) place it in quotation marks; if you employ a longer passage from a publication or web site, please indent it and use single spacing. In both cases, be sure to cite the original source in a footnote or in parentheses. If you refer to or summarize (without quoting) a significant idea or argument that is not yours, then make a footnote reference to the publication where it appears, to make clear that the idea did not originate with you.

If you are not clear about the expectations for completing an assignment or taking a test or examination, be sure to seek clarification from your professor or GSI beforehand.

Finally, you should keep in mind that as a member of the campus community, you are expected to demonstrate integrity in all of your academic endeavors and will be evaluated on your own merits. So be proud of your academic accomplishments, and of thinking for yourself, and help to protect and promote academic integrity at Berkeley. The consequences of cheating and academic dishonesty – including punishment and a formal discipline file, possible loss of future internship, scholarship, or employment opportunities, and denial of admission to graduate school – are simply not worth it. The whole issue is taken more seriously than you may imagine, in all professional areas.

Class Schedule - *Please bring readings to class*.

Days   Readings

Please note: Some of the readings are long, and you will be assigned in class
              selected parts to give the most attention.

Scientific Explanation

1/22 – 1/24   Hempel, *Aspects of Scientific Explanation*,
                        pp. 333-54, 412-415, 364-403 **CP**

1/29 – 1/31   Salmon, 'Statistical Explanation,' **CP**

2/5 – 2/7 **QUIZ**   Kitcher, 'Explanatory Unification,' **CP**

Confirmation and Disconfirmation

2/12   Hume, *Enquiry*, §§ IV, V, **CP**

2/14 – 2/19 **QUIZ** Popper, *Objective Knowledge*, ch. 1, **CP**
                      Salmon, 'Rational Prediction,' **CP**

2/21 – 2/26   *Philosophy of Science*, pp. 66-101, **bSPACE**
                      Howson and Urbach, *Scientific Reasoning*,
                        117-131, CP

2/28   Kendall, 'Designing a Research Project,' **ONLINE**

2/28   *First Paper Due* – questions will be distributed

The Unit of Representation: Theories, Models, Templates

2/28 – 3/5   Giere, 'Models and Theories,' **CP**

3/7   **QUIZ**   Giere, 'How Models are Used …,' **ONLINE**

3/12 – 3/14 **QUIZ** Bogen and Woodward, 'Saving the Phenomena,' **ONLINE**

3/19 – 4/2   Humphreys, 'Computational Science,'**CP**

3/26 – 3/28 *Spring Break* – no class

Experiment and Simulation

4/2 – 4/4   **QUIZ**   Parker, 'Does Matter Really Matter?…,' **ONLINE**

4/9 – 4/11   Winsberg, 'Introduction,' and 'Sanctioning Models:
                   Theories and their Scope,' Chapters 1 and 2, *Science
                   in the Age of Computer Simulation*, **BOOK**

4/16 – 4/18   Winsberg, 'Methodology for a Virtual World,'
                   Chapter 3, *Science in the Age of Computer Simulation*,
                   BOOK

4/23 – 4/25 **QUIZ** Winsberg, 'A Tale of Two Methods,' Chapter 4,
                   BOOK

4/30 – 5/2   Winsberg, 'Reliability without Truth,' and 'Conclusion,'
                   Chapters 7 and 8, **BOOK**

5/7 – 5/9   *Reading Week*

5/9   *Second Paper Due* – questions will be distributed

Locations of online readings:

Earman and Salmon 'The Mathematical Theory of Probability,'
    from: *Introduction to the Philosophy of Science*, Merrilee H.
    Salmon, ed., Hackett, Indianapolis, 1999, 66-101.   **bSpace**

Kendall, 'Designing a Research Project …,' *Emergency Medical Journal* 20
    (2003), 164-168.   doi:10.1136/emj.20.2.164

Giere, 'How Models are Used to Represent Reality,' *Philosophy of Science*,
    Vol. 71, No. 5 (December 2004), 742-752.

Bogen and Woodward, 'Saving the Phenomena,' *Philosophical Review* (July
    1988), 303-352.

Parker, 'Does Matter Really Matter? …' *Synthese* 169 (2009), 483-496.

You can look these up by the name of the journal, on the Berkeley libraries
website. The journals are accessible only via a Berkeley connection, but you can
set up a Berkeley connection to use off campus on your personal computer by
using your ID. See the library website (under "Help," "connecting from off
campus") for how to set up a proxy server.