Spring 2009

Philosophy 196S:
Models and Analogies in the Natural and Social Sciences

Instructors

Professor K.D. Hoover
Office: 231 Social Science Building
(West Campus)
Telephone: 660-1876
E-mail: kd.hoover@duke.edu
Personal Website: http://www.econ.duke.edu/~kdh9
Office Hours: 10:00-11:00 AM
Tuesdays and Fridays and by appointment. I am available outside of office hours only by appointment. Arrange an appointment either after class or by telephone or e-mail.

Professor S.G. Sterrett
Office: 201C West Duke Building
(East Campus)
Telephone: 660-3054
E-mail: sterrett@duke.edu
Personal Website: http://fds.duke.edu/db/aas/Philosophy/faculty/sterrett
Office Hours: Email to arrange a mutually convenient time to meet.

Administrative Details

Lecture: 4:25-6:55 PM, Monday, 204 West Duke Building (East Campus). [NB: The first meeting is actually on Wednesday 7 January 2009, which replaces the Martin Luther King Holiday on Monday 19 January 2009.]
Course website: http://www.econ.duke.edu/~kdh9/Courses/Models/Models_master.htm or access through Blackboard. We will keep up-to-date information about the course on the website.

Prerequisites
There are no specific prerequisites, although some background in either science or philosophy will be a benefit. Students from all majors are welcome.

Course Description
We will begin by addressing the question of the nature and role of models in science. We'll consider the gamut from purely mathematical models to the kind of models that are concrete, physical things with which one can play around and experiment. Several weeks will be devoted to reading about the role and function of particular kinds of models from the disciplines of physics, chemistry, neuroscience, economics, political science, biology, sociobiology, biomedical research, and, even, climate modeling. With this broad range of models in hand, we'll go on to discuss questions in philosophy of science about the role of models, analogies and metaphors in scientific discovery, in drawing scientific
inferences, and in providing scientific explanations. The readings will be a mixture of papers by scientists and philosophers.

**Required Work and Grading**

There are *three required graded parts to the course*:

1. *Weekly short assignments*: 30 percent. These assignments are meant to make sure that you are up to speed on, and engaged in, the primary readings. More detailed instructions, including details of each week’s readings and due dates, can be found on the [Weekly Assignments link](#) on the [course website](#).

2. *Class participation*: 30 percent. The class will be conducted as a seminar and discussion and participation is essential. Students are expected to be prepared to discuss topics and to participate actively.

3. *Analytical papers*: 40 percent. There will be four longer analytical papers during the semester. Three of the papers will be due during the semester on *Monday 9 February*, *Monday 23 March*, and *Monday 20 April*. The last paper will be in lieu of a final examination and will be due on *Thursday 30 April*. Analytical papers will address questions set by the instructors – there will be a choice of questions, and the questions will be announced two to three weeks ahead of the due date. We will provide further details in class.

**Academic Ethics**

We will hold you to strict standards of academic ethics. We encourage students to discuss economics and the class material together, to help each other in coming to understand the material. Nevertheless, work submitted for a grade must ultimately be the work of the individual student – not copied from another student or from any other source. The weekly assignments are not research papers and, generally, do not rely on secondary sources. However, any direct quotation should be clearly attributed to its source. The analytical papers are also not research papers in the sense that we expect you to find sources other than those on the reading list. Nevertheless, you very likely will refer to specific passages and arguments in the materials that you use (and it is not impossible that you may refer to secondary sources). All such references to sources other than your own thoughts require *scholarly documentation* (i.e. footnotes, bibliography, or other citation forms); *quotations must be properly indicated* (e.g., by quotation marks) and *sources of information and ideas that are beyond the commonplace properly documented*. Plagiarism is a serious matter and is totally unacceptable. If you have any doubts about what is appropriate and acceptable, please contact one of us.
Readings

All readings are electronically accessible: go to the Readings link on the course website. From there, you can either click on direct links through the library or download through links to a secure directory. We will send the login and password information for the secure directory to registered members of the class by email. (If you need the login and password and don’t have it, please email Professor Hoover.) Exactly which readings are due each week can be found on the course website under the link Weekly Assignments.

A. Models and Analogies --General

B. Experimental Models
Rom Harré. The Logic of the Sciences. [excerpt pages 86-87 (from “At this point it will be useful . . “ on p. 86 to “the simplest kind of conceptual paramorph.” on p. 87.]

C. Analogies and Metaphors
D. Models in Physics and Chemistry


E. Models in Biology


F. Models in Social Sciences


G. Models in Economics

H. Models and Analogy in Discovery

I. Models and Inference
J. Models and Explanation
Mary S. Morgan. “Learning from Models,” in Mary S. Morgan and Margaret
Morrison, editors. Models as Mediators: Perspectives on Natural and Social
Herbert Mehrtens. “Mathematical Models,” in Soraya de Chadarevian and Nick Hop,
Mary B. Hesse. “The Explanatory Function of Metaphor,” Models and Analogies in
Mechanisms,” in Nalini Bhushan and Stuart Rosenfeld, editors. Of Minds and
Molecules: New Philosophical Perspectives on Chemistry. Oxford University
Press, 2000, ch. 12 (pp. 211-229).