Philosophy 125: Scientific Reasoning
Section 001: MWF 9-10; CHBE 102
Section 002: MWF 11-12: ESB 2012

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This course looks at general issues arising in the reasoning practices used in the sciences. Our main issues will cut across different sciences, raising practical and philosophical questions about the roles and limits of evidence in scientific practice. We will also concern ourselves with issues of the public understanding of science—and with public and personal decisions based on scientific research. Students vary widely in their scientific background; no prior expertise in science is presumed but if you have expertise we will gladly hear it. Throughout we shall have copious examples and we will concentrate on four main current issues issues: vaccines and the anti-vaccine movement, climate change, research into gender, sex, and human capacity.

Learning Objectives:

When you finish this course you will be better able to assess the presentation of evidence for scientific claims and better able to understand how scientific knowledge influences policy. You will be able better to understand why there are controversies around certain scientific issues and to think more critically about why scientific consensus does not always bring social consensus.

Readings:

There is no textbook; the readings will be from me, from web resources, and from media. Readings will be placed on UBC Connect and/or given out in class and sent out via the UBC Faculty Service Centre.

Calendar:

First week (6, 8 Sept): Introduction to our topic and our terms—science, sciences, reason, reasons, reasoning.

Second Week (11, 13, 15 Sept): Some basic logic as a system of formalized reasoning; deduction and induction; logical fallacies

Third Week (18, 20, 22 Sept): Cognitive and social biases and how we might overcome them.

Fourth Week (25, 27, 29 Sept): The basics of statistical reasoning and decision theory; decisions in science; decisions using science; science and policy

Fifth Week (2, 4, 6 Oct): **EXAM ON 2 OCTOBER!** Are vaccines safe? What are the issues?

Sixth Week (11, 13 Oct): Statistics in social and medical science; randomized trials, p values; Bayesian alternatives

Seventh Week (16, 18, 20 October): Focus point: Is there a replication crisis in social science?

Eighth Week (23, 25, 27 Oct): Issues in Modeling Complex Systems; Simulation as Scientific Reasoning

Ninth Week (30 Oct, 1, 3 Nov): Why is there public controversy over climate change?

Tenth Week (6, 8, 10 Nov): **EXAM ON 6 NOVEMBER!** Theory building in the sciences; concept formation; confirmation and disconfirmation; inference to the best explanation

Eleventh Week (12, 15, 17 Nov): Intertheoretical relations; consilience of theories; levels of explanation

Twelfth and Thirteenth Weeks (20, 22, 24, 27, 29 Nov; 1 Dec): Extended case study on the study of human behaviour: what does "science say" about gender differences and coding?

Evaluation:

There are two midterms worth 20% each (40%)
There is a December final exam worth 30%
There are six short assignments each worth 5% (30%)—due at 4 pm on 11 Sept, 25 Sept, 11 Oct, 25 Oct, 10 Nov, 27 Nov.

Most important policies:

Attendance in class is expected—it is, after all, the best place to learn the material.

Assignments are lose 20% of their value for each day they are late. (So an assignment worth 5% and due on Monday can get at most 4% if turned in on Tuesday, etc.)

Electronic devices: our readings will be on line and we will want also to look at websites in class, so I cannot prohibit computers in class. For your own sake and the sake of those around you, you must limit your use of electronic devices to activities relevant to our course. The

research is clear that irrelevant activities harm not only your own but also your fellow students' quality of work.

The most relevant University policies are listed in the *Calendar* http://www.calendar.ubc.ca/vancouver/.

Two especially important ones are:

Academic Misconduct: http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,54,111,0

Academic Concession: http://www.calendar.ubc.ca/vancouver/index.cfm?tree=3,48,0,0