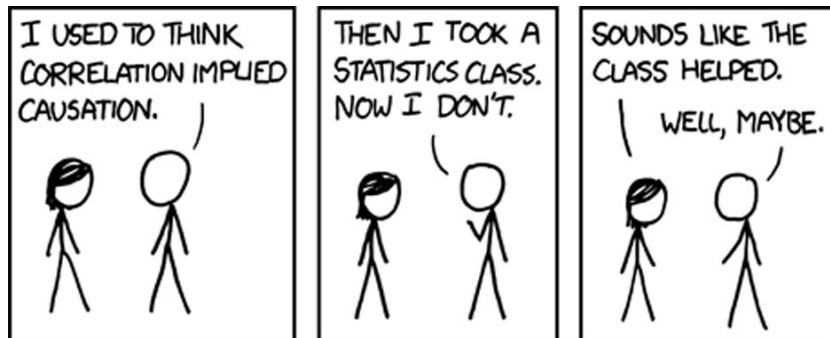


PHIL 12

SCIENTIFIC REASONING



Spring 2016

Instructor: Kerry McKenzie

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Office Hours: Weds 3-5pm, H&SS 8088

SCHEDULE OF CLASSES

<i>Wk: Date</i>	<i>Topic</i>
1: 03/28	1. Introduction and Overview
1: 03/30	2. Introduction to Argument: Supporting a Conclusion
2: 04/04	3. Deductive Arguments: Validity and Soundness
2: 04/06	4. Inductive Arguments: Making Probable
3: 04/11	5. Inductive Generalization: Polling and Sampling
3: 04/13	6. Imprecision and Confidence Level
4: 04/18	7. Correlations and Statistical Significance
4: 04/20	8. Introduction to Causation
5: 04/25	9. Mill's Methods for Inferring Causes
5: 04/27	10. Randomized Controlled Trials
6: 05/02	11. Animal Testing: An Argument by Analogy
6: 05/04	12. Junk food, junk science, junk journalism?
7: 05/09	13. Introducing unobservables: Hypothetico Deductivism
7: 05/11	14. Hypothetico Deductivism 2
8: 05/16	15. The Problem of Induction
8: 05/18	16. Exam
9: 05/23	17. Does it matter what we call 'science'? The case of homeopathy
9: 05/25	18 Values in Science I
10: 06/01	19 NO CLASS
10: 06/03	20 Values in Science II

SCHEDULE OF ASSIGNMENTS

- **Assignment 1** Concepts of Argument: due 4/18
- **Assignment 2** Unpicking a scientific paper: due 4/27
- **Assignment 3** Correlation, Causation, and Science Journalism: due 5/11
- **Exam** In class, 5/18.
- **Reflection paper.** Submit in class during scheduled exam period, June 9th.

1 Objectives, methods, requirements

1.1 What this course is about

This course concerns a topic of great social, philosophical, and personal significance: the nature and justification of scientific claims. In it, we will look at a range of topics including: the nature of inductive justification; how the statistics describing the makeup of societies and the likely outcomes of our lifestyle choices are arrived at; how the safety and efficacy of diets and medicines are assessed; how we acquire knowledge of unobservable entities, such as quarks, electrons and black holes; and what, if anything, makes scientific theories different in kind from those of other disciplines, such as the humanities and ‘quack’ fields such as parapsychology and astrology.

A key theme running throughout the course is that, although we take science to be the paradigm of rational activity, scientific knowledge is never certain. But today many incompatible claims on how to think about the world and how to act in it compete for our attention – claims that come from folk theories, pseudosciences, and indeed the sciences themselves. As such, it seems that we must negotiate a concept of justification that is, on the one hand, relaxed enough to allow some theoretical claims to be regarded as sufficiently justified even though we are not certain about them, while on the other hand also strong enough to exclude many such claims. Thinking about how good is good enough will be a recurrent theme in what we do.

1.2 Objectives

On completion of this module students should be able to critically discuss a variety of issues concerning the nature of scientific evidence and the ways in which scientific theories are justified. The main topics include: inductive and causal reasoning; confirmation and the scientific method; the relation of science and values.

1.3 Assessment

There are six parts to your assessment.

- Assignment on concepts of argument (8%) – submit at lecture, 4/18.
- Assignment unpicking a scientific paper (15%) – submit at lecture, 4/27.
- Assignment on correlation, causation, and science journalism (17%) – submit at lecture, 5/11.
- In-class exam (37%) – 5/18.
- Final essay (18%) – submit in class during schedule exam period, June 9th.
- Attendance (5%) (0.5% per section attended with credit for holidays / week 1.)

First three assignments. Please submit these in lecture. There will be a 3 mark penalty for all work received between the due date and the first weekend after then, a 5 mark penalty for all work received after that.

Exam. Ahead of time, you will be given five questions on inductive reasoning to think about, of which three will be chosen for the exam. You will write short essays on two.

Final essay. In addition, you will a short reflective essay on the topic of **values and science**. This essay should be typed, double-spaced, and between 1,000 and 1,500 words in length (no less, no more). Please also submit via Turnitin.

In grading the essays I will be looking for three things, weighted roughly equally:

Comprehension: understanding of the concepts and ideas discussed in the essay.

Clarity: presentation of the ideas and concepts in a clear and concise manner.

Engagement: independent thinking about the items under discussion.

You must submit both a hard copy of your paper as well as submit it through Turnitin.

Grading scale. Your TAs will be assigning letter grades for your exam and term paper corresponding to these marks:

$97 - 100 = A^+$	$87 - 89 = B^+$	$77 - 79 = C^+$	$67 - 69 = D^+$
$93 - 96 = A$	$83 - 86 = B$	$73 - 76 = C$	$60 - 66 = D$
$90 - 92 = A^-$	$80 - 82 = B^-$	$70 - 72 = C^-$	$< 60 = F$

The final letter grade you receive however will be ‘graded to the curve’, so that the top 25-30% of students will get a grade in the A range, the next 25-35% a grade in the B range, the next 25-30% a grade in the C range, and the remaining 5-25% a D or an F. This is the minimum I guarantee; if the class has worked well and no-one deserves a D or an F, the curve will be adjusted accordingly.

Academic Integrity.

UCSD is committed to academic integrity. According to their *Policy on Integrity of Scholarship*,¹

“Integrity of scholarship is essential for an academic community. The University expects that both faculty and students will honor this principle and in so doing protect the validity of University intellectual work. For students, this means that all academic work will be done by the individual to whom it is assigned, without unauthorized aid of any kind.”

If you are unsure in any way of what acting with integrity demands of you in this context, I’ll be happy to discuss it with you.

Set reading. You should acquire *Scientific Thinking* by Robert M. Martin. Extra readings will be put up on TED. Don’t hesitate to get in touch if you would like anything else to read!

¹For the full statement, go to <https://students.ucsd.edu/academics/academic-integrity/policy.html>