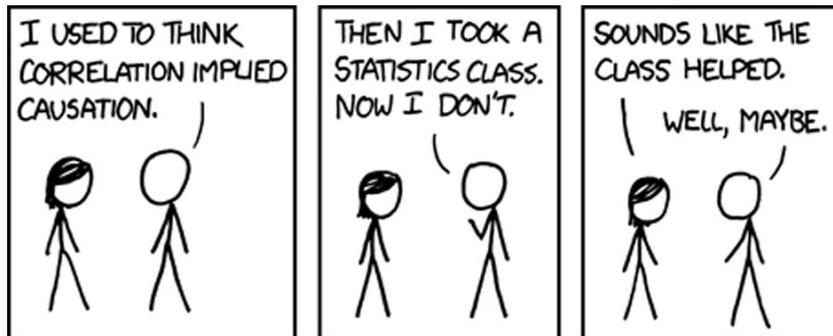# PHIL 12

SCIENTIFIC REASONING

Fall 2017

Instructor: Dr. Kerry McKenzie
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Office Hours:
Monday: 11am-12am in H&SS room 7093
Wednesday: 10am-11am in H&SS room 7093

Schedule of Classes

Wk: Date	Topic
1: 10/02	1. Introduction and Overview
1: 10/04	2. Introduction to Argument: Supporting a Conclusion
2: 10/09	3. Deductive Arguments: Validity and Soundness
2: 10/11	4. Inductive Arguments: Making Probable
3: 10/16	5. Inductive Generalization: Polling and Sampling
3: 10/18	6. Imprecision and Confidence Level (or: 'Brexit times 5')
4: 10/23	7. Correlations and Statistical Significance
4: 10/25	8. Introduction to Causation
5: 10/30	9. Mill's Methods for Inferring Causes
5: 11/01	10. Randomized Controlled Trials: the 'Gold Standard'
6: 11/06	11. Animal Testing 1: An Argument by Analogy
6: 11/08	12. Animal Testing 2: The Scaling Hypothesis
7: 11/13	13. Food Science 1: Questioning questionnaires
7: 11/15	14. Food science 2: Assessing Atkins: high protein, high weight-loss, high risk?
8: 11/20	15. Review
8: 11/22	16. Exam
9: 11/27	17. Revisiting the 'gold standard': 'Alternative medicine' and the scope of RCTS
9: 11/29	18. Revisiting the 'gold standard': the scope of RCTS (cont'd)
10: 12/04	19. Revisiting the 'gold standard': confronting 'repligate'
10: 12/06	20. Envoi

Schedule of Assessment

- **Assignment 1** Concepts of Argument (10%): submit in lecture, 10/16

- **Assignment 2** Unpicking a scientific paper (15%): submit in lecture, 11/01

- **Assignment 3** Correlation, Causation, and Science Journalism (20%): submit in lecture, 11/20

- **Exam** (35%): In class, 11/22.

- **Reflection paper** (20%): Submit through Turnitin by end of scheduled exam period – 2.30pm on 12/14 (Thursday of exams week).

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 certainty, practicality and informativeness must be traded off; how the statistics describing the makeup of societies are produced; and how the safety and efficacy of diets and medicines are assessed via human and animal subjects. Towards the end, we will reflect on the quality of contemporary science reporting, and consider the standing of evidence gleaned from RCTs given the 'repligate' crisis and claims that RCTs are inappropriate to 'alternative thereapies'. By doing so, we have a chance to reflect on what as a society we might want from science and science journalism, and what steps we might take to improve them to better further those ends.

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.

First three assignments. Please submit these in lecture. There will be a letter grade penalty for all work received between the due date and the following Friday, and a further letter grade penalty for work received the following Monday. No work will be accepted more than one week after the due date.

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. Exam scripts will start looking at an 'A' to the extent that you (a) show that you understand the **relevant general principles** involved in the type(s) of inductive inference appropriate to the question at hand, and (b) identify the **specific challenges** that would confront any attempt to answer the specific research question and the most promising ways to respond to them. That is, you will be given top marks to the extent that you can describe both the formal and the informal aspects of the research question at hand.

Final essay. You will a concise, high-quality newspaper-style article concerning an issue of social or normative significance raised by the course. You may wish to write about:

- the roots and implications of the paucity of women in clinical trials;

- the problems endemic to food science, and their socio-cultural implications;

- the rationale for the scaling hypothesis in animal testing;

- the applicability of RCTs to homeopathic treatments;

- the roots and / or implications of the replication crisis;

- the roots of the dramatic failures of election polling in the recent US and UK elections.

Alternatively, you may write on a topic of your own choice <u>provided I have approved the topic in advance</u>. This essay should be typed, double-spaced, and between 1,000 p/m 100 words in length (no less, no more), and be written in the style of a high-quality newspaper article. Use your reflections in Assignment 3 to inform your writing. Please submit both a hard copy in class during scheduled exam period and also via Turnitin by the end of that period. **CITE EACH AND EVERY SOURCE THAT YOU USE.** Work that plagiarizes existing newspaper articles will automatically be assigned an F.

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.

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 <u>Policy on Integrity of Scholarship</u>,[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 <u>Scientific Thinking</u> 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!

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