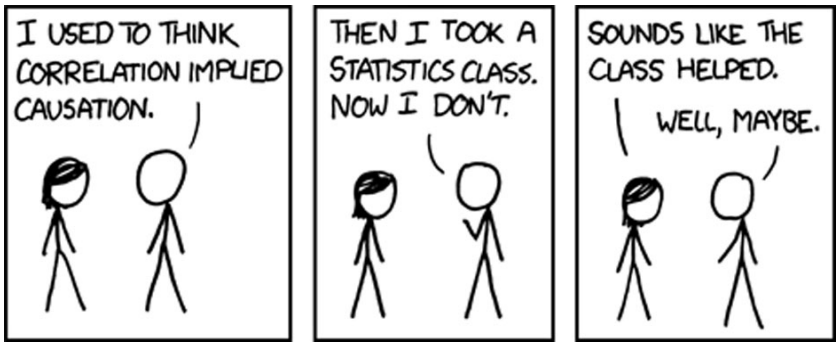
PHIL 12

SCIENTIFIC REASONING



Fall 2024

Instructor: Dr. Kerry McKenzie
kmckenzie@ucsd.edu
TAs: Bosco Garcia (A01: Mon 10am [HSS 1305] and A03: Mon 12-12.50 [CENTR 220]), and Javier Medina Barrientos (A02: Weds 1-1.50pm[CENTR 220] and A04 Fri 12-12.50, [CENTR 203])
jgarca@ucsd.edu and jmb224@ucsd.edu
Lectures: Mon & Weds 11-11.50am, CENTR 212.

Office Hours: Kerry: Wednesday 12-1pm, RWAC 0499.
Bosco: Tues & Thurs 11am-12pm, RWAC 0436.
Javier: Mon & Weds 9.45-10.45am, RAWC 0438.

SCHEDULE OF CLASSES

Wk: Date	Topic
1: 09/30	1. Introduction and Overview
1: 10/02	2. Introduction to Argument: Supporting a Conclusion (Chap 1)
2: 10/07	3. Deductive Arguments: Validity and Soundness (Chap 2)
2: 10/09	4. Inductive Arguments: Making Probable (Chap 2)
3: 10/14	5. Inductive Generalization: Polling and Sampling (Chaps 3 & 4)
3: 10/16	6. Imprecision and Confidence Level (Chap 5)
4: 10/21	7. Correlations (Chaps 6 & 7)
4: 10/23	8. Statistical Significance (Chap 8)
5: 10/28	9. Introduction to Causation (Chap 17)
5: 10/30	10. Randomized Controlled Trials I: Mill's Methods (Chap 18 and 19.5)
6: 11/04	11. Randomized Controlled Trials II: the 'Gold Standard' (Chap 20)
6: 11/06	12. Observational Studies / The Placebo Effect (Chap 22.3-22.6 / Chap 21.1-21.3)
7: 11 /11	13. NO CLASS: Veteran's Day
7: 11/13	14. In-class midterm
8: 11/18	15. Animal Testing: An Argument by Analogy (Chap 21.4-21.8)
8: 11/20	16. Food Science: Questioning questionnaires (Reading: Martin Chap 22.7-22.10)
9: 11/25	17. Science and Values 1: The fact / value distinction (Reading: Weber extract)
9: 11/27	18. Science and Values 2: 'Following the Science' (Reading: David Leonhardt)
10: 12/02	19. Live controversies 1: Pregnancy advice (Reading: Jen Gunter and Aaron Carroll)
10: 12/04	20. Envoi: Trouble in paradise (Optional reading: Mastrioni)

SCHEDULE OF ASSIGNMENTS

- **Assignment 1** Concepts of Argument (10%): submit online by 10pm, Weds 10/16
- **Assignment 2** Unpicking a scientific paper (15%): submit online by 10pm, Weds 10/30
- **Assignment 3 / Midterm** Understanding Study Design (25%) : takes place in class, Weds 11/13
- **Assignment 4** Correlation, Causation, and Science Journalism (25%): submit online by 10pm, Weds 11/27
- **Assignment 5** Be the editor! (25%): submit only by 10pm on 12/11 (Wednesday of exams week)

1 Objectives, methods, requirements

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; how the safety and efficacy of diets and medicines are assessed via human and animal subjects; and how social factors influence the content of scientific studies and the conclusions drawn from them. In the process, we will have a chance to reflect on what as a society we might want from science, from science journalism, and from policymakers, and what steps we might take to achieve that.

Key outcomes. The key outcomes of this course are the development of:

- An understanding of basic logical concepts concerning both deductive and inductive arguments.
- An understanding of the trade-off between confidence and informativeness.
- An understanding of statistically significant correlation and the relation of correlation to causation.
- An understanding of the logic of the RCT and the steps required to approve a medication for the market.
- An understanding of how social factors, especially gender-based and commercial interests, can influence science and science policy.
- A sense of what good science journalism consists of and some of the dilemmas of science policy-making.

2 Assignments.

Submission of assignments. Everything except the midterm exam is to be submitted online through Canvas. There will be a penalty for late work as described in the submission instructions. All assignments must be submitted in order to pass the class. Note that some of these assignments require the drawing of some simple diagrams. Please just find a way to make these legible to your TA – they don't need to be a work of art. You can draw them on a separate piece of paper and take a picture with your phone, then include in a Word document (or any other brute-force method).

Note also that these assignments are not all out of 100. Given the limited functionality of Canvas I may be letting you know in class which marks receive which letter grade.

In grading written work we will be looking for three things, weighted roughly equally:

Comprehension: do you show a good understanding of the technical concepts underlying your argument?

Clarity: do you present your argument clearly and concisely?

Engagement: where relevant, do you have an independent and exciting take on the issue? Do you make a good case that the issue is worth thinking about?

Final grade. The final letter grade you receive will be calculated as follows. There is a grading rubrik associated with each of your assignments: they are not all out of 100 and the cut-offs for different letter grades vary across assignments. At the end of the quarter, your raw score in each of your assignments will converted into a letter grade. Your final grade is the weighted sum of these letter grades; you can see above how much weight each individual assignment has.

Penalty for late work. Assignments 1, 2, 4 will receive a 5% penalty for every day they are late. Assignment 5 **must be submitted on time if it is not to receive an F.**

Readings. Our textbook is Scientific Thinking by Robert M. Martin (either edition is fine). We'll omit part 2 but read most of the rest. The last two or three weeks of the course I'll be putting different material up on Canvas for you to look at and think about. Don't hesitate to get in touch if you would like anything else to read!

3 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. Any extra readings will be put up on Canvas. Don't hesitate to get in touch if you would like anything else to read!

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