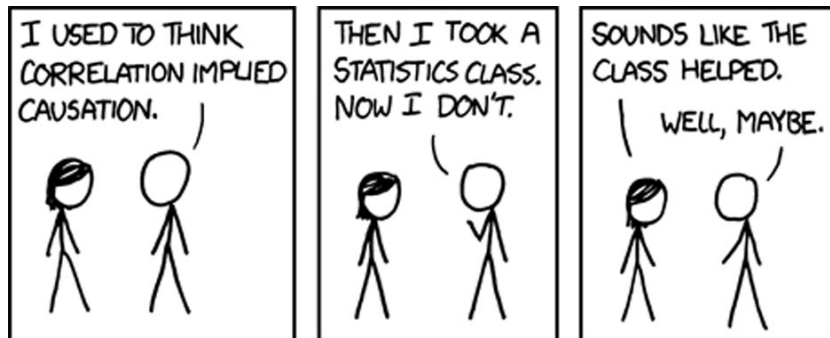


PHIL 12

SCIENTIFIC REASONING



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Spring 2024

Instructor: Dr. Kerry McKenzie

kmckenzie@ucsd.edu

TAs: Gabriel Nyberg (A01: Mon 9am [CENTR 220] and A02:

Weds 10am [HSS 1305], and Bosco Garcia (A03: Mon 4pm

[PSYNH 240) and Wed 1pm, [CENTR 205])

gnyberg@ucsd.edu and jgarca@ucsd.edu

Lectures: CSB 1, 11am MW.

Office Hours: Kerry: Wednesday 12-1pm, RWAC 0499.

Bosco: Tues 9-11 RWAC 0436.

Gabriel: Mon 3pm & Weds 1pm, RAWC 0432.

SCHEDULE OF CLASSES

| <u>Wk: Date</u> | <u>Topic</u> |
|-----------------|--|
| 1: 04/01 | 1. Introduction and Overview |
| 1: 04/03 | 2. Introduction to Argument: Supporting a Conclusion (Chap 1) |
| 2: 04/08 | 3. Deductive Arguments: Validity and Soundness (Chap 2) |
| 2: 04/10 | 4. Inductive Arguments: Making Probable (Chap 2) |
| 3: 04/15 | 5. Inductive Generalization: Polling and Sampling (Chaps 3 & 4) |
| 3: 04/17 | 6. Imprecision and Confidence Level (Chap 5) |
| 4: 04/22 | 7. Correlations (Chaps 6 & 7) |
| 4: 04/24 | 8. Statistical Significance (Chap 8) |
| 5: 04/29 | 9. Introduction to Causation (Chap 17) |
| 5: 05/01 | 10. Randomized Controlled Trials I: Mill's Methods (Chap 18 and 19.5) |
| 6: 05/06 | 11. Randomized Controlled Trials II: the 'Gold Standard' (Chap 20) |
| 6: 05/08 | 12. Observational Studies / The Placebo Effect (Chap 22.3-22.6 / Chap 21.1-21.3) |
| 7: 05 /13 | 13. Animal Testing: An Argument by Analogy (Chap 21.4-21.8) |
| 7: 05/15 | 14. In-class midterm |
| 8: 05/20 | 15. Food Science: Questioning questionnaires (Reading: John Ionaddis) |
| 8: 05/22 | 16. Science and Values 1: 'Follow the Science' (Reading: David Leonhardt) |
| 9: 05/27 | 17. Memorial day – no class |
| 9: 05/29 | 18. Science and Values 2: Rudner's challenge (Reading: Heather Douglas) |
| 10: 06/03 | 19. Science and Values 3: Pregnancy advice (Reading: Jen Gunter and Aaron Carroll) |
| 10: 06/05 | 10. Envoi |

SCHEDULE OF ASSIGNMENTS

- **Assignment 1** Concepts of Argument (10%): submit online by 10pm, Weds 4/17
- **Assignment 2** Unpicking a scientific paper (15%): submit online by 10pm, Weds 5/01
- **Assignment 3** Understanding Study Design (25%) : In class, Weds 05/15
- **Assignment 4** Correlation, Causation, and Science Journalism (25%): submit online by 10pm, Weds 05/29
- **Assignment 5** Be the editor! (25%): Here you will read, edit, and re-write a news article or press release. Submit through Turnitin by 10pm on 6/12 (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, influence science policy.
- A sense of what good science journalism consists of and some of the dilemmas of science policy-making.
- Some understanding of the pervasiveness of vaccine hesitancy.

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 will 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 ‘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.

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!

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