

Medical Knowledge and its Limits

Spring 2025

Professor: Ted Poston
Email: ted.poston@ua.edu

Time: TR 2:00-3:15pm
Place: Gordon Palmer 228

Student Hours

After class, or by appointment.

Description

Medical knowledge, marching in step with the development of scientific knowledge, has made great strides over the last 150 years. The 19th century development of the germ theory of disease produced the first effective antibiotics and led to significant improvements to sanitation in medical settings. Through the progress of new imaging technology, better tools, and aseptic surgical techniques, surgery became much safer and more effective. Whereas the history of medicine shows that often the cure was worse than the disease, the great progress by medicine led to much confidence in the effectiveness of new medical interventions. Yet many claims about the *effectiveness* of medical interventions are not supported by the *evidence*. This course examines the rise of evidence-based medicine and its controversies, including debates about evidential hierarchies, the reliance on less-than-straightforward concepts such as *placebo* and *masking*, the dismissal of mechanistic reasoning, and the relegation of medical expertise. The course also explores recent arguments from the ubiquity of small effect sizes in medicine, the extent of misleading evidence in medical research, the thin theoretical basis of many interventions, and the malleability of empirical methods to show that medical interventions are generally less effective than we are led to believe. The class will work through Howick's (2011) *The Philosophy of Evidence Based Medicine*, Jacob Stegenga's (2018) *Medical Nihilism*, and Judea Pearl's (2018) *The Book of Why*.

Required Texts

1. Jeremy Howick, *The Philosophy of Evidence-Based Medicine*.
2. Jacob Stegenga, *Medical Nihilism*.
3. Judea Pearl & Dana Mackenzie, *The Book of Why*

Assignments

1. Attendance (15%)
 - a. Each day you earn a point for attending. You have two allowed absences for the semester. These are best saved in case of sickness. The attendance calculation will drop the lowest two scores.
2. Reading quizzes (30%) – in general, these will not be announced ahead of time
3. 5 YouTube group discussions over selected topics (30%)
4. Final YouTube project (25%)

Grading Standard

The final grades for the class will be calculated with the following ranges: A+=97-100 A=93-96 A-=90-92 B+=87-89 B=83-86 B-=80-82 (and so on...)

Important dates

Tuesday Jan 28 1st group project – no in person class
Thursday Feb 20 2nd group project – no in person class
Thursday March 6 3rd group project – no in person class

Tuesday March 25th 4th group project – no in person class

Thursday April 10th 5th group project – no in person class

Statement on Academic Misconduct

Students are expected to be familiar with and adhere to the official Code of Academic Conduct provided in the Online Catalog.

Statement on Disability Accommodations

Contact the Office of Disability Services (ODS) as detailed in the Online Catalog.

Severe Weather Protocol

Please see the latest Severe Weather Guidelines in the Online Catalog.

Pregnant Student Accommodations

Title IX protects against discrimination related to pregnancy or parental status. If you are pregnant and will need accommodations for this class, please review the University's FAQs on the UAct website.

Religious Observances

Under the Guidelines for Religious Holiday Observances, students should notify the instructor in writing or via email during the first two weeks of the semester of their intention to be absent from class for religious observance. The instructor will work to provide reasonable opportunity to complete academic responsibilities as long as that does not interfere with the academic integrity of the course. See full guidelines at Religious Holiday Observances Guidelines.

UAct Statement

The UAct website provides an overview of The University's expectations regarding respect and civility

How to write a philosophy paper (and prepare for a podcast or YouTube discussion)

Start your paper by stating your goal. Say what you are going to accomplish. Then do it! Here are my grading criteria and some helpful tips.

1. Intelligibility. Can I understand what you're trying to say?
2. Clarity. Is your paper clear? Do you express your points with precision?
3. Understanding. Do you understand the writers and the issues well?
4. Support. Do you support what you say with reasons and arguments?
5. Depth. Do you get at the heart of the issues? Or does your paper show only a superficial understanding?

Strunk and White's Rules

- Use the active voice.
- Put statements in positive form.
- Use definite, specific, concrete language.
- Omit needless words.
- Avoid a succession of loose sentences.
- Keep related words together.

- Write in a way that comes naturally.
- Write with nouns and verbs.
- Revise and rewrite.
- Do not overwrite.
- Do not overstate.
- Avoid fancy words.
- Be clear.
- Do not take shortcuts at the cost of clarity.

Pryor's Rules

- Use simple prose.
- If you wouldn't say it, don't write it.
- Make the structure of your paper obvious.
- Be concise but explain yourself fully.
- Say exactly what you mean.
- Pretend that your reader is lazy, stupid, and mean.
- Use examples and definitions.
- Present and assess the views of others critically, but with understanding.
- Anticipate objections.
- If something in a view you're examining is unclear to you, don't gloss it over. Call attention to the unclarity. Suggest several different ways of understanding the view.

Paul's Principles

- If you are going to evaluate an argument, be sure to formulate the argument as clearly as you can. Don't ever say that an argument is good or bad, valid or invalid, convincing or not, unless you lay it out explicitly.
- Always say precisely what you mean. Reread to make sure that your wording isn't unclear.
- Don't use rhetorical questions.
- Argue for your claims.
- If you don't need to make a contentious claim to make your point, don't make the claim.
- If something you say isn't necessary for proving your point, or helpful in elucidating what you mean, drop it.
- Don't bite off more than you can chew. Given the choices of being broad and shallow or narrow and deep, go for narrow and deep.
- Never say an unkind word about any thinker or that thinker's intentions.
- Be careful of amphiboly: it will invite your critics to poke fun at your expense.
- Do all of the thinking for your reader. Never leave any inference, no matter how obvious, to the (in)capable hands of your reader. The same goes for explaining quotations. Always tell the reader what she should take from the quotation, even if it is obvious to you.
- Use signposts. First tell me what you are going to do. Then tell me that you are doing it. Finally, tell me what you have done.
- Never employ a technical term before defining it unless you are confident that your reader knows exactly what it means from you.
- Proof-read!

Course Outline

PART I: THE PHILOSOPHY OF EVIDENCE-BASED MEDICINE

A. WHAT IS EVIDENCE-BASED MEDICINE

Lecture 1: [The controversy over medicine knowledge](#)

Tuesday, January 14

Reading

1. Howick Ch 1 pp. 3–9; Stegenga Ch 1 pp. 1–19

Lecture 2: [EBM & good evidence for clinical decisions](#)

Thursday, January 16

Reading

1. Howick Ch 2 & 3 pp. 10–30

Background reading:

1. “[Evidence-based Medicine: A new approach to the practice of medicine](#)”

B. THE METHODOLOGY OF RANDOMIZED CONTROL TRIALS

Lecture 3: [Rival hypotheses & the paradox of effectiveness](#)

Tuesday, January 21

Reading

1. Howick Ch 4 & 5 pp. 33–62

Background reading:

1. Smith & Pell “[Parachute use to prevent death and major trauma](#)”

Lecture 4: [Fisher significance tests & randomization](#)

Thursday, January 23

Reading

1. Worrall “[Evidence in Medicine and Evidence-Based Medicine](#)”

Background reading

1. Fisher “[The Design of Experiments](#)” Chapters 1 & 2
2. Fisher, “[Cigarettes, Cancer, and Statistics](#)”

Lecture 5: [Ideal RCTs & probabilistic causality](#)

Tuesday, January 28 (1st Podcast / YouTube discussion due – no in person class)

Reading

1. Cartwright “[Are RCTs the Gold Standard?](#)”
2. Grossman & Mackenzie “[The randomized controlled trial: gold standard or merely standard?](#)”

Background reading:

1. Cartwright “[What Are Randomized Controlled Trials Good For?](#)”
2. Deaton & Cartwright “[Understanding and Misunderstanding Randomized Controlled Trials.](#)”

Assessment

- 1st Group Project: Discuss Cartwright’s main question “Are RCTs the gold standard?”

Lecture 6: [The Science of causal inference](#)

Thursday, January 30

Reading

1. Pearl *The Book of Why* Introduction & Chapter 1
- Background reading
1. “On Pearl’s Hierarchy and the Foundations of Causal Inference” <https://causalai.net/r60.pdf>

Lecture 7: [A history of causal inference, the rise of statistics, and Bayesian inference](#)

Tuesday, February 4

Reading

1. Pearl *The Book of Why* Chapters 2 & 3

Lecture 8: [Confounding and Deconfounding](#)

Thursday, February 6

Reading

1. Pearl *The Book of Why* Chapter 4

Lecture 9: [Smoking & Simpson’s Paradox](#)

Tuesday, February 11

Reading

1. Pearl *The Book of Why* Chapters 5 & 6

Background reading

1. Cartwright “[Causal Laws and Effective Strategies](#)”

Assessment

- Short paper 3 (Application of Causal Diagrams)

Lecture 10: [Pearl’s Big Idea](#)

Thursday, February 13

Reading

1. Pearl *The Book of Why* Chapters 7 & 8

Lecture 11: [Counterfactuals & Data](#)

Tuesday, February 18

Reading

1. Pearl *The Book of Why* Chapters 9 & 10
2. [DAG With Omitted Objects Displayed \(DAGWOOD\): a framework for revealing causal assumptions in DAGs](#)

Assessment

- 2nd group project due on Thursday Feb 20th (no in person class)

Lecture 12: [Statistical Prediction Rules](#)

Tuesday, February 25

Reading

1. Bishop & Trout “The Amazing Success of Statistical Prediction Rules”

Background reading

1. Paul Meehl, [Clinical Versus Statistical Prediction: A Theoretical Analysis and a Review of the Evidence](#)

Assessment

PLACEBOS

Lecture 13: [Double masking & Placebo Controls](#)

Thursday, February 27

Reading

1. Howick Ch 6 & 7 pp. 63–95
2. Holman “[Why Most Sugar Pills Are Not Placebos](#)”

Background

1. Howick “[Sticks and Stones...and Words can hurt you: the Nocebo Effect](#)” (YouTube)

Lecture 14: More on Placebos

Tuesday, March 4

Reading

1. Howick Ch 8 pp. 96–116
2. Due “[What are Side Effects?](#)”

Background

1. Miller and Brody [Understanding and Harnessing the Placebo Effect: Clearing away the Underbrush.](#)

Assessment

MECHANISTIC REASONING

Lecture 15: The role of mechanistic reasoning in EBM

Thursday, March 6 (no in person class)

Reading

1. Howick Ch 9 & 10 pp. 119–157

Background reading

1. Gillies, D “[Mechanisms in Medicine](#)”
2. Assessment: 3rd group discussion on the role of mechanistic reasoning in EBM.

Lecture 16: More on the role of mechanistic reasoning in EBM

Tuesday, March 18

Reading

1. Illari “[Mechanistic Evidence: Disambiguating the Russo–Williamson Thesis](#)”

Background reading

1. Vallance, [Can biological activity be maintained at ultra-high dilution? An overview of homeopathy, evidence, and Bayesian philosophy](#)
2. Tonelli & Williamson (2020) “[Mechanisms in clinical practice: use and justification](#)”

EXPERT JUDGMENT

Lecture 17: Trust & Expertise

Tuesday, March 25 (4th group project discussion; no in person class)

Reading

1. Goldman “[Experts: Which Ones Should You Trust?](#)”
2. Wieten “[Expertise in EBM](#)”

Lecture 18: Trust & Expertise

Thursday, March 27

Reading

1. Howick Ch 11 & 12
2. Mark Tonelli (2011) “[Not a philosophy of clinical medicine: a commentary on “The Philosophy of Evidence-based Medicine”](#)”
3. Mark Tonelli & Robyn Bluhm (2020) “[Teaching Medical Epistemology within an evidence-based medicine curriculum](#)”

PART II: MEDICAL NIHILISM

EFFECTIVENESS

Lecture 18: Effectiveness & the nature of disease

Tuesday, April 1

Reading

1. Stegenga Ch 2 “Effectiveness of Medical Interventions”
2. R. Cooper “[Disease](#)”

Background reading

Lecture 19: What is an effective medical intervention?

Thursday, April 3

Reading

1. Stegenga Ch 3 “Effectiveness & Medicalization”
3. Stegenga Ch 4 “Magic Bullets”

Background reading

EVIDENCE

Lecture 20: Against evidential hierarchies

Tuesday, April 8

Reading

1. Stegenga Ch 5 “Down with the Hierarchies”
2. Watch this overview on the Cochrane meta-analysis: <https://youtu.be/egJlW4vkb1Y>

Assessment

Lecture 21: The perils and promise of meta-analysis

Thursday, April 10 (5th group project due. No in person class)

Reading

1. Stegenga Ch 6 “Malleability of Meta-Analysis”
2. Holman “[In Defense of Meta-Analysis](#)”

Assessment

Lecture 22: Assessing Medical Evidence

Tuesday, April 15

Reading

1. Stegenga Ch 7 “Assessing Medical Evidence”
2. [AMSTAR 2](#)
3. Hill “[The Environment and Disease: Association or Causation?](#)”

Background reading

1. Dammann, Poston, and Thagard “[How do medical researchers make causal inferences?](#)”
2. Woodward, J. (2010). [Causation in biology: stability, specificity, and the choice of levels of explanation](#). *Biology & Philosophy*, 25(3), 287–318.
3. Rothman, K. J., & Greenland, S. (2005). [Causation and causal inference in epidemiology](#). *Am J Public Health*, 95 Suppl 1, S144–50.
4. Howick, J., Glasziou, P., & Aronson, J. K. (2009). [The evolution of evidence hierarchies: what can Bradford Hill’s ‘guidelines for causation’ contribute?](#) *J R Soc Med*, 102(5), 186–94.

Lecture 23: Measuring Effectiveness

Thursday, April 17

Reading

1. Stegenga Ch 8 “Measuring Effectiveness”

Background reading

Assessment

- Quiz 11

Lecture 24: Evaluating harm profiles

Tuesday, April 22

Reading

1. Stegenga Ch 9 “Hollow Hunt for Harms”
2. Winsberg, et. al. “[How Government Leaders Violated Their Epistemic Duties during the SARS-CoV-2 Crisis](#)”

Assessment

EVIDENCE AND VALUES

Lecture 25: Bias & Fraud

Thursday, April 24

Reading

1. Stegenga Ch 10 “Bias & Fraud”
2. Fuller “[Meta-Evidence Research for Evaluating Therapies](#)”

Background reading:

1. John Ioannidis (2005) [Why most published research findings are false](#)
2. Alex Bird (2020) [Understanding the Replication Crisis as a Base Rate Fallacy](#)

Final project: Due Friday May 2

Extra topics & readings

Medical Nihilism

Reading

1. Stegenga Ch 11 “Medical Nihilism”
2. Stegenga Ch 12 “Conclusion”
3. [Book Forum](#) on *Medical Nihilism*

Extrapolation & Absence of Evidence

Reading

1. Fuller “[The myth and fallacy of simple extrapolation in medicine](#)”
2. [Elliott Sober](#) “[Absence of Evidence and Evidence of Absence](#)”

Gentle medicine

Miles, “[On a medicine of the whole person](#)”