

Professor Deborah G. Mayo
 Major Williams 235 mayod@vt.edu
 Office Hours:TBA & appt

PHIL 6014 (crn: 20919): Spring 2023
Philosophy of Inductive-Statistical Inference
 Wed 4:00-6:30 pm, McBryde 223

Syllabus: First Installment

D. Mayo (2018) *Statistical Inference as Severe Testing: How to Get Beyond the Statistics Wars* (CUP, 2018):
 SIST (electronic and paper provided to those taking the class; proofs are at errorstatistics.com)
 Articles from the Captain’s Bibliography (links to new articles will be provided)

<i>Date</i>	<i>Themes/readings</i>
1. 1/18	<p>Introduction to the Course: How to tell what’s true about statistical inference</p> <p>Reading: SIST: Preface, Excursion 1: Tour I: 1.1-1.3, 9-29</p>
2. 1/25	<p>Error Probing Tools vs Comparative Evidence: Likelihood & Probability What counts as cheating? Intro to Logic: arguments validity & soundness</p> <p>Reading: SIST: Excursion 1: Tour II: 1.4-1.5, 30-55</p>
3. 2/1	<p>Induction and Confirmation: PhilStat & Formal Epistemology</p> <p>The Traditional Problem of Induction Is Probability a Good Measure of Confirmation? Tacking Paradox</p> <p>Reading: SIST: Excursion 2, Tour I: 2.1-2.2, 59-74 Optional: Hawthorne and Fitelson (2004)</p>
4. 2/8 & 5. 2/15	<p>Falsification, Science vs Pseudoscience, Induction Statistical Crises of Replication in Psychology & other sciences</p> <p>Assign 1: 2/15 Reading for 2/8: Popper, Ch 1 from <i>Conjectures and Refutations</i>. Popper test. Reading for 2/15: SIST: Excursion 2, Tour II: 2.3-2.7, pages TBA Popper, severity and novelty, array of problems and models Fallacies of rejection, Duhem’s problem; solving induction now</p>
	Fisher Birthday: February 17: Celebration of N-F wars
6. & 7. 2/22 & 3/1	<p>Ingenious and Severe Tests: Fisher, Neyman-Pearson, Cox: Concepts of Tests</p> <p>Reading SIST: Excursion 3, Tour I: 3.1-3.3, 119-163 (trade-offs 328-330) the 1919 eclipse tests; Fisherian and N-P Tests; Frequentist principle of evidence: FEV</p> <p>Apps for statistical testing</p>
	<i>SPRING BREAK Statistical Exercises While Sunning (March 4-12)</i>

The following is very tentative, and will depend on student interests

8. 3/15 Assign 2	Confidence & Fiducial Intervals and Deeper Concepts: Higgs Discovery
9. 3/22	Objectivity in Science: Objectivity in Error Statistics & Bayesian Philosophies
10. 3/29 Short essay	Bayes factors and Bayes/Fisher Disagreement
11. 4/5	Biasing Selection Effects, P-Hacking, Data Dredging etc.
12. 4/12 Assign 3	Negative Results: Power vs Severity
13. 4/19	Should Statistical Significance Tests be Abandoned, Retired, or Replaced?
14. 4/26	Severity, Sensitivity, Safety: PhilStat and Classical Epistemology
15. 5/3	Current Reforms and Stat Activism: Practicing Our Skills
	Final Paper

THIS SYLLABUS IS SUBJECT TO CHANGE AS ANNOUNCED IN CLASS COMMUNICATION

Evaluation (this will be custom-tailored to student's strengths & interests). The following is tentative:

3 assignments (choice of reading questions or exercises) 35; Short essay 20; Participation 10

Class presentation or short write up of an example from your field of interest 5+ extra credit.

Final paper or project 30.

Methodological discussions and advocacy today is directed at being nontechnical or requiring very minimal understanding of technical complexities. However, the discussions are often mired in confusion, and infused with controversial philosophical assumptions. This course will enable you to critically assess these arguments and debates, apply statistical ideas to doing original research in philosophy of science, and across the landscape of fields that involve statistical ideas and controversies.

Reading. An active and interesting class will be the result of your engaging in discussion, which in turn depends on having done the bulk of the readings. I have posted short summaries of each Excursion so you can get an overview. There are also "souvenirs" (takeaways). Skip whatever sections seem too technical, but ask about them in class. I will generally send questions for the next class, depending on the activity of the day. I expect some guest presentations in the spring. The syllabus will include some catch-up days.

The text distills many years of working through the materials, so the reading isn't heavy, but there's a lot packed in. A long list of original sources are linked to this syllabus, in a separate Bibliography (others are likely to be added) in the Captain's library. I will pinpoint some these as optional in connection with class themes. Your final paper includes at least 2 of these resources. We have people with very different backgrounds and interests—as we have in the past—and letting participants choose which areas they want to spend the most time on easily accommodates this. I will also adjust topics in the syllabus accordingly.

Class presentations: I would like to give everyone the opportunity to present a portion of the seminar, perhaps as a pair or team. This has worked well in the past. Anyone who prefers not to (or if there's insufficient time) can write (and share) an example of a current controversy in your field of interest. Everyone is free to earn extra credit points by sharing examples or contributing to my blog.

Doing PhilStat: I will provide a separate document on what's special about doing and writing philosophy. It involves a type of generosity of interpretation, and slow pondering over a position and argument, that might feel different for those who haven't written philosophy before. However, it's a skill that will make you a better writer and more critical thinker in any field. It will feel new to some of you, please be patient. By the same token, working with formal notions and equations might be new to some. You will be able to work in groups on the exercises. Be patient and trust me. I will always give many examples associated with a "stat exercise". The book is written so that an idea not caught in one place is caught in another. We'll work in stages, not questioning everything at once. So everyone is bound to be energized and stimulated, and we will all be in a much better position to contribute to the urgent business of improving science and philosophy of science.

