

## 2023 Syllabus for Philosophy of Inductive-Statistical Inference

PHIL 6014 (crn: 20919): Spring 2023

Philosophy of Inductive-Statistical Inference

(This is an IN-PERSON class\*)

Wed 4:00-6:30 pm, McBryde 223

(Office hours: Tuesdays 3-4; Wednesdays 1:30-2:30)

Syllabus: Second Installment ([PDF](#))

D. Mayo (2018) *Statistical Inference as Severe Testing: How to Get Beyond the Statistics Wars* (SIST) CUP, 2018: SIST (electronic and paper provided to those taking the class; proofs are at [errorstatistics.com](http://errorstatistics.com), see below). Supplemental text: Hacking, I. (2001). *An introduction to probability and inductive logic*. Cambridge University Press. Articles from the [Captain's Bibliography](#) (links to new articles will be provided). Other useful information can be found on the SIST [Abstracts & Keywords](#) and this [post](#) with SIST Excerpts & Mementos)

Date	Themes/readings
1. 1/18	<p><b>Introduction to the Course: How to tell what's true about statistical inference)</b>  <b>Reading:</b> <i>Statistical Inference as Severe Testing: How to Get Beyond the Statistics Wars</i> (SIST): <a href="#">Preface</a>, <a href="#">Excursion 1 Tour I</a> 1.1-1.3, 9-29  <b>MISC:</b> Souvenir <a href="#">A</a>; SIST <a href="#">Abstracts &amp; Keywords</a> for all excursions and tours  <b>(1/18/23 SLIDES <a href="#">here</a>)</b></p>
2. 1/25 <b>Q #2</b>	<p><b>Error Probing Tools vs Comparative Evidence: Likelihood &amp; Probability</b>            What counts as cheating?            Intro to Logic: arguments validity &amp; soundness  <b>Reading:</b> SIST: <a href="#">Excursion 1 Tour II</a> 1.4-1.5, 30-55  <b>Session #2 Questions:</b> (<a href="#">PDF</a>)  <b>MISC:</b> <a href="#">NOTES on Excursion 1</a>, SIST: Souvenirs <a href="#">B</a>, <a href="#">C</a> &amp; <a href="#">D</a>, <a href="#">Logic Primer</a> (<a href="#">PDF</a>)  <b>(1/25/23 SLIDES <a href="#">here</a>)</b></p>
3. 2/1 <b>Q #3 UPDATED</b>	<p><b>Induction and Confirmation: PhilStat &amp; Formal Epistemology</b>            The Traditional Problem of Induction            Is Probability a Good Measure of Confirmation? Tacking Paradox  <b>Reading:</b> SIST: <a href="#">Excursion 2, Tour I</a>: 2.1-2.2, 59-74            Hacking "The Basic Rules of Probability" Hand Out (<a href="#">PDF</a>)  <b>UPDATED: Session #3 Questions:</b> (<a href="#">PDF</a>)  <b>MISC:</b> Excursion 2 Tour I <a href="#">Blurb &amp; notes</a>  <b>(2/1/23 SLIDES <a href="#">here</a>)</b></p>
4. 2/8 & 5. 2/15 <b>Assign 1 2/15</b>	<p><b>Falsification, Science vs Pseudoscience, Induction Statistical Crises of Replication in Psychology &amp; other sciences</b>            Popper, severity and novelty, array of problems and models            Fallacies of rejection, Duhem's problem; solving induction now  <b>Reading for 2/8:</b> Popper, Ch 1 from <i>Conjectures and Refutations</i> up to p. 59. (<a href="#">PDF</a>),            This class overlaps with the next, so if you have time read <a href="#">Excursion 2, Tour II</a>: (p. 75-82);            Exhibit vi. (p. 82); and p. 108  <b>Session #4 Questions:</b> (<a href="#">PDF</a>)  <b>MISC (2/8):</b> Self-quiz on Popper for Fun! (<a href="#">PDF</a>); Cartoon Guide to Statistics (Link to VT Library link is <a href="#">here</a>)  <b>(2/8/23 SLIDES <a href="#">here</a>)</b></p> <hr/> <p><b>Reading for 2/15:</b> SIST: <a href="#">Excursion 2, Tour II</a>: read sections that interest you from those not covered last week. You can choose the example in 2.6 (or one from your field) or the discussion of solving induction in 2.7. Optional for 2/15: Gelman &amp; Loken (2014)  <b>(2/15/23 SLIDES <a href="#">here</a>)</b></p> <p><b>ASSIGNMENT 1 (due 2/15) (<a href="#">PDF</a>)</b>  <b>MISC (2/15):</b> SIST Souvenirs (<a href="#">E</a>), (<a href="#">F</a>), (<a href="#">G</a>), (<a href="#">H</a>); Excursion 2 Tour II <a href="#">Blurb &amp; notes</a></p>

	Fisher Birthday: February 17: Celebration on 2/22
6. 2/22 Q #6 & 7. 3/1	<p><b>Ingenious and Severe Tests: Fisher, Neyman-Pearson, Cox: Concepts of Tests</b></p> <p><b>Reading for 2/22 from</b> SIST: <a href="#">Excursion 3 Tour I</a>: 3.1-3.3: read the sections that interest you, choosing to focus on the statistical tests, the history and philosophy of Fisher, Neiman and Pearson, the example of GTR. <b>Choose 2 from the Triad (they're very short): Fisher (1955), Pearson (1955), Neyman (1956)</b></p> <p><b>Session #6 Questions: (PDF)</b></p> <p><b>Optional: The pathological Fisher (fiducial) and Neyman (performance) battle: SIST 388-391 (2/22/23 SLIDES <a href="#">here</a>)</b></p> <hr/> <p><b>Reading for 3/1:</b> Sections from SIST skipped last week: <a href="#">Excursion 3 Tour I</a>: (If time, look at the discussion of trade-offs <a href="#">328-330</a>) If interested in fiducial frequencies, see Neyman's Performance and Fisher's fiducial Section 5.8</p> <p><b>Optional: <a href="#">Excursion 3 tour II</a>: It's the methods, stupid!</b></p> <p><b>MISC:</b> Excursion 3 Tour I <a href="#">Blurb &amp; notes</a>; <a href="#">Souvenirs (I)</a>, <a href="#">(J)</a>, <a href="#">(K)</a></p> <p><b>Morey app including Examples &amp; Instructions (<a href="#">here</a>);(Morey <a href="#">app</a>) (<a href="#">SEV Apps</a>) (3/1/23 SLIDES <a href="#">here</a>)</b></p>

SPRING BREAK Statistical Exercises While Sunning (March 4-12)

Sessions #11-14 are tentative; please have a look at what's in them so we can decide which to skip

8. 3/15 <b>Assign 2</b>	<p><b>Deeper Concepts (2 parts): Stat in the Higg's discovery, and Confidence intervals and their duality with tests</b></p> <p><b>Reading</b> (for first part): <a href="#">Excursion 3 Tour III</a>, 3.8 Higgs Discovery (See the ASA 6 principles on P-values: Note 4, P. 216, and Live Exhibit (ix) p. 200: <a href="#">Souv. N</a> p. 201</p> <p><b>Reading</b> (for second part): <a href="#">Excursion 3 Tour III</a>, 3.7: pp. 189-195</p> <p><b>Assignment 2 (PDF)</b> due 3/17/23</p> <p><b>Misc.</b> Excursion 3 Tour III <a href="#">blurb &amp; notes</a> (3/15/23 (revised) SLIDES <a href="#">here</a>)</p>
9. 3/22	<p><b>Testing Assumptions of Statistical Models (Guest Speaker: Aris Spanos on misspecification testing in statistics)</b></p> <p><b>Reading:</b> <a href="#">Excursion 4 Tour IV</a> 4.8</p> <p><b>Misc.</b> Excursion 4 Tour IV <a href="#">blurb &amp; notes</a> (3/22/23 A. Spanos' SLIDES <a href="#">here</a>)</p>
10. 3/29	<p><b>Who's Exaggerating what? Bayes factors and Bayes/Fisher Disagreement, Jeffreys-Lindley Paradox (Guest Speaker: Richard Morey on Bayes Factors)</b></p> <p><b>Reading.</b> <a href="#">Excursion 4 Tour II</a> and <a href="#">Excursion 6, Tour I</a>: 395-423 (We will spend 2 weeks on these: Excursion 6 Tour I will be post zoom.)</p> <p>"Redefine Statistical Significance" Benjamin et al. 2017. (<a href="#">PDF</a>)</p> <p><b>Session #10 Questions (PDF)</b></p> <p><b>Misc.</b> Excursion 4 Tour II <a href="#">blurb &amp; notes</a></p> <p><b>Richard Morey's slides (<a href="#">Link</a>); (R. Morey blog <a href="#">post</a>, which goes into more detail.)</b></p>
11. 4/5 <b>Mini essay</b>	<p><b>More on: Bayes factors and Bayes/Fisher Disagreement, Jeffreys-Lindley Paradox</b></p> <p><b>Reading.</b> <a href="#">Excursion 4 Tour II</a> and <a href="#">Excursion 6, Tour I</a>: 395-423 (We are spending 2 weeks on these: Excursion 6 Tour I will be post zoom.)</p> <p><b>Optional: Objectivity in stat Excursion 4 Tour I:</b> 4.1, 4.2; 221-238</p> <p>Peek Ahead: 6.7 <a href="#">Farewell Keepsake</a>: 436-444</p> <p><b>Mini-essay (PDF)</b> <b>4/05/23 SLIDES (PDF)</b></p>

12. 4/12	<p><b>Biasing Selection Effects and Randomization</b>  <b>Reading:</b> <a href="#">Excursion 4 Tour III</a>  <b>4/12/23 Slides (PDF)</b>  ASA Statement on P-values (<a href="#">link</a>)  Optional: Mayo: <a href="#">P-values on Trial</a></p>
13. 4/19	<p><b>Power: Pre-data and Post-data</b>  <b>Reading:</b> <a href="#">Excursion 5 Tour I</a>  <b>Misc.</b> Excursion 5 Tours I &amp; II <a href="#">blurbs-notes</a>  <b>Slides (PDF)</b></p>
14. 4/26 <b>Assign 3</b>	<p><b>Positive Predictive Value and Probabilistic Instantiation</b>  <i>Controversies about inferring probabilities from frequencies (in law and epistemology)</i>  <b>Reading:</b> Tail end of Excursion 5 Tour I: Exhibit (v), Souvenir X: SIN and SIR; Excursion 5 Tour II: Section 5.6 (<a href="#">excursion 5 Tour II</a>); Farewell Keepsake: (Section 6.7)  <b>Optional:</b>  (1) C. Howson “Error Probabilities in Error” (<a href="#">1997</a>);  (2) Mayo “Response to Howson and Laudan” (<a href="#">1997</a>) [only the portion responding to Howson];  We won’t consider the following, but I leave it here in case anyone wants to look at it: Gardiner and Zaharatos (<a href="#">2022</a>), “The Safe, the Sensitive, and the Severely Tested”;  <b>ASSIGNMENT 3 (due 4/26) (PDF)</b>  <b>Slides (PDF)</b></p>
15. 5/3	<p><b>Review of the main themes of the seminar</b>  Current Reforms and Stat Activism: Practicing our skills on some recent papers  <b>Reading: 6.6 (pp 432-6) Error Statistical Bayesians;</b> <i>one of the following:</i> (they can also be your “new” reading for the final paper</p> <ul style="list-style-type: none"> <li>▪ Ioannidis (<a href="#">2005</a>), “Why most published research findings are false” <a href="https://journals.plos.org/plosmedicine/article/file?id=10.1371/journal.pmed.0020124&amp;type=printable">https://journals.plos.org/plosmedicine/article/file?id=10.1371/journal.pmed.0020124&amp;type=printable</a></li> <li>▪ Amrhein et al. (<a href="#">2019</a>). “Retire Statistical Significance”. <i>Nature</i> 567: 305-307.(optional)</li> </ul>
	<p><b>Final Paper (PDF)</b></p>