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PHIL 6334/ ECON 6614: Spring 2019
Current Debates on Statistical Inference and Modeling

Wed. 4:00-6:30pm Derring Hall 1076

Syllabus: First Installment

Date	Theme/Assignment
1. 1/23	<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. 1/30	<p>Error Probing Tools vs Logics of Evidence Intro to Logic: arguments validity & soundness</p> <p>Reading: SIST: Excursion 1: Tour II: 1.4-1.5, 30-55; Excursion 2: 60-64(&class notes on logic)</p> <ul style="list-style-type: none"> • Spanos Lecture notes 1
3. 2/6 EX 1a	<p>Induction and Confirmation</p> <p>Reading: SIST: Excursion 2, Tour I: 2.1-2.2, 59-74 The Traditional Problem of Induction Is Probability a Good Measure of Confirmation?</p>
4. 2/13 Q-1	<p>Falsification, Pseudoscience, Induction</p> <p>Reading: SIST: Excursion 2, Tour II: 2.3-2.7, 75-115 Popper, severity and novelty, Fallacies of rejection, NHST, replication crisis in psychology; solving induction now</p>
Fisher Birthday: February 17: Celebration of N-F wars	
5. 2/20 Q-2 outline	<p>Ingenious and Severe Tests</p> <p>Reading SIST: Excursion 3, Tour I: 3.1-3.3, 119-163 Lessons from the 1919 eclipse tests; N-P Tests; Fisherian Tribes, Frequentist principle of evidence: FEV</p> <ul style="list-style-type: none"> • Spanos Lecture notes 2

6. 2/27 EX 2	<p>It's the Methods, Stupid</p> <p>Reading: Excursion 3 Tour II: 3.4-3.6, 164-188 Famous Howlers and Chestnuts of Tests P-values and Error Probabilities</p>
7. 3/6 Q-2	<p>Capability and Severity: Deeper Concepts</p> <p>Reading: Excursion 3 Tour III: 3.7-3.8, 189-217 Pages on fiducial probability from 5.8: 382-4; 388-391</p> <p>Severity, capability & confidence Intervals; Neyman's performance and Fisher's fiducial probability, Five sigma and the Higgs discovery</p> <ul style="list-style-type: none"> • Spanos Lecture notes 3
<p><i>SPRING BREAK Phil Stat While Sunning</i> <i>Exercises TBA; 6.7 Farewell Keepsake: 436-444</i></p>	
8. 3/20 EX 3-4	<p>Objectivity and Auditing</p> <p>Reading: Excursion 4 Tour I: 4.1, 4.2; Tour II: 4.3, 221-246</p> <p>The myth of 'the myth of objectivity' (4.1, 4.2); Statistical significance and sample size (4.3)</p> <p><i>Spring Break exercises</i></p>
9. 3/27	<p>Rejection Fallacies: Who's Exaggerating What?</p> <p>Reading: Excursion 4 Tour II: 4.3, 4.4, 246-266</p> <p>Jeffrey-Lindley paradox or Bayes/Fisher disagreement Severity Interpretation of Rejection: SIR</p>
10. 4/3 Q-4	<p>Biasing Selection Effects, P-Hacking, Data Dredging etc.</p> <p>Reading: Excursion 4 Tour III: 4.6, 267-286; Souvenir T, 294-5; Court case of Dr. Paul Hack, error control is necessary for severity control, paradox of replication; when searching doesn't damage severity</p> <p>CHOOSE ONE:</p> <p>Statistical Theatre: "Les Miserables Citations" 5.7, 371-377 The Miserable Passages in the hands of contemporaries; 378-381</p>

	4.7 Randomization (includes DevEcon): 286-294
11. 4/10 Ex 1b	<p>Objectivity and Model Checking: Mis-Specification (M-S) Testing I</p> <p>Reading: Excursion 4 Tour IV: 4.8, 296-305; 307-320</p> <p>All Models Are False; For Model-Checking, They Come Back to Significance Tests</p> <p><i>Optional:</i> 4.10, Bootstrap resampling, 305-7</p> <ul style="list-style-type: none"> • Spanos Lecture notes 4

Neyman's Birthday: April 16: N-P Power Party

12. 4/17 revisions of short essay (optional) Ex 5	<p>Mis-Specification (M-S) testing II</p> <p><i>Reading:</i> TBA</p> <p>Testing individual assumptions vs. joint testing; auxiliary regressions and M-S testing; respecification; challenges to M-S testing: avoiding circularity</p> <ul style="list-style-type: none"> • Spanos Lecture notes 5
13. 4/24 Q-5	<p>Power and Severity</p> <p>Reading: Excursion 5 Tour I: 5.1-5.4, 323-352</p> <p>Power howlers, power analysis and insignificant results, severity interpretation of non-rejection: SIN; severity curves</p> <ul style="list-style-type: none"> • Spanos Lecture notes 6
14. 5/1	<p>How Not to Corrupt Power</p> <p>Reading: Excursion 5 Tour II: 5.5, 5.6, 353-370</p> <p>Power taboos retrospective power, shpower</p> <p>Positive predictive value; the diagnostic-screening model of tests and how its confusing replication research</p>
15. TBA	<p>Foundations Lost and Found</p> <p>Reading: Excursion 6, Tour I, Tour II, 395-423; 424-444</p> <p>What Ever Happened to Bayesian Foundations? Pragmatic and Error Statistical Bayesians <i>Farewell Keepsake</i></p>
	FINAL PAPER DUE

THIS SYLLABUS IS SUBJECT TO CHANGE AS ANNOUNCED IN CLASS COMMUNICATION

Statistics TA: email and office hours: Hoang-Phuong Do hphuong@vt.edu, Monday: 3:00-4:00 pm, Pamplin Hall 3117.

Evaluation (tentative)

9 short items (~50)

- 4 of 5 responses to reading questions or outlines of main concepts in the reading (details will be given)
- 4 of 5 prob/stat exercises 1
- Short example from your field of interest.

Short essay + rewrite 15

Final paper 25

Participation and Contributions (~10)

An active and interesting class will be the result of your engaging in discussion, which in turn depends on having done the readings—hence the reading questions. We have posted short summaries of each Excursion on Canvas, so you can get an overview. 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 should you wish to look something up.

Some topics will be more familiar to some of you than others. You're not expected to master all of it but to strengthen and enrich your understanding and ability to contribute to the current debates that are occurring over the landscape of science and science policy. What's missing is the combination of statistical and philosophical acumen—and that's what you will take away from this seminar.

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. We gave a list of “stat wars” the first day (see the slides from meeting one), but you will likely wish to add to them. We will ask you to settle on a general area after a couple of weeks so that you can start focusing in on it in your assignments. If you want to swap an extra “exercise”, which will involve some statistical application, for a reading question, or do more of either for extra credit, you are free to.

Class presentations: We 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 instead write a longer final paper. In that case it's worth 30, and participation ~5. However, everyone is free to earn extra credit points by doing more.

Short example of a Star War debate in a field that interests you. Find and share an article or event, with a 1 page-write up, discussed with the class. Maybe some participants would wish to contribute to my blog errorstatistics.com.

Doing PhilStat: We 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 leave you as a better write 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. Be patient and trust us. We will always give many examples associated with a “stat exercise” (Ex 1-5). If it's a bust, we'll give you another. We want you to learn. By the way the book is written so that an idea not caught in one place is caught in another. Even those of you who are highly trained in statistics will find that many, if not all, the concepts you accept actually retain assumptions and demand much deeper qualification and questioning. 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.