

Syllabus – STOR 892
Reading Classics:
Topics in Foundations of Statistics
Fall 2025 (August 18 – December 12)
Section 001, TuTh 9:30-10:45am
Hanes 125

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| Instructor: | Jan Hannig | Phone: | (919) 962-7511 |
| Office: | 320 Hanes | E-mail: | jan.hannig@unc.edu |
| Office Hours: | M 2:30 – 3:25pm and by appointment | Course home page on | https://hannig.cloudapps.unc.edu//STOR892 https://unccch.instructure.com/courses/98539 |

Zoom Link: <https://unc.zoom.us/j/91518533732?pwd=ySUcuFIDxa7vNynW3VaajCEmDziHaX.1>

Target Audience: Ph.D. students in the Department of Statistics and Operations Research. It is assumed that students have taken enough advanced statistics courses to be able to read research articles.

Required Text:

- The list of papers we will read in this class can be found below.

Optional Text:

- Kotz, S., & Johnson, N. L. (Eds.). (2012). Breakthroughs in Statistics: Foundations and basic theory. Springer Science & Business Media

Course Objective: In this class we will discuss statistical papers that had a big influence on the field.

Assessment: Your grade will be based on class presentation, scribing, and participation. Sign up for the tasks here: [Google Sheet](#)

Readings and Annotation. Each student is responsible for all reading material assigned. By midnight on Sundays prior to each class, everyone will post regarding this week's reading material online on forums on Canvas with at least one question, a response to a question, or a comment. The task is to identify and point out a concept or an argument that you don't understand and ask a question about it, explaining what about it you don't understand. Alternatively, you can answer somebody else's question. We will incorporate these questions into the discussion during class.

Leading a Class Discussion. Each week, a team of two students will prepare a presentation aimed for generating an interactive class discussion. Presenters assume that everyone read the material, and are prepared to critically analyze it and add insight to the reading. The presentation should highlight key results/definitions/concepts from the

reading and briefly summarize it (no more than 10 min). Presenting students will also incorporate questions posted on the forums on Canvas offer their answers and/or direct them to the class. We encourage presenters to include their own questions and/or general thoughts about the assigned material, think of examples that illustrate main results, trace further development of highlighted ideas in the literature, and offer further readings for those who are interested. The presentation should be planned as one would plan a discussion section, not a lecture.

Scribing. A team of students will be assigned for each meeting to write down all the questions and answers, thoughts, claims and ideas that come up during the class. The presenting team will provide their materials to the scribing team so that they can incorporate all the notes that they took and tie everything together. The scribing team has one week to draft the notes and e-mail them to the presenting team for further revision and comments. At the end, the document should summarize the ideas presented in the class, based on the assigned reading, as well as recount the discussion that followed. Note that the discussion should not be transcribed completely word-for word, but rather in the form of a summary of the main points, although citations are permitted if necessary. The final version of the scribing is due to Jan two weeks after the presentation.

Course Outline:

Week 1

Pearson, K. (1900). On the criterion that a given system of deviations from the probable in the case of a correlated system of variables is such that it can be reasonably supposed to have arisen from random sampling. *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*, 50(302), 157-175.

Student. (1908). The probable error of a mean. *Biometrika*, 1-25.

Week 2

Fisher, R. A. (1922) On the Mathematical Foundations of Theoretical Statistics. *Philosophical Transactions of the Royal Society of London Series A*.

Fisher, R. A. (1925). Theory of Statistical Estimation. *Mathematical Proceedings of the Cambridge Philosophical Society*, 22(5), 700–725.

Savage, L. J. (1976). On rereading R.A. Fisher. *The Annals of Statistics*, 441-500.

Week 3

Neyman, J., & Pearson, E. S. (1933) On the problem of the most efficient tests of statistical hypotheses. *Philosophical Transactions of the Royal Society of London. Series A*, 231, 289-337.

Bartlett, M. S. (1937). Properties of sufficiency and statistical tests. In *Proc. R. Soc. Lond. A* (Vol. 160, No. 901, pp. 268-282). The Royal Society.

Week 4

Wald, A. (1939). Contributions to the theory of statistical estimation and testing hypotheses. *The Annals of Mathematical Statistics*, 10(4), 299-326.

Birnbaum, A. (1962). On the foundations of statistical inference. *Journal of the American Statistical Association*, 57, 269–326.

Week 5

Edwards, W., Lindman, H., & Savage, L. J. (1963). Bayesian statistical inference for psychological research. *Psychological review*, 70(3), 193

Dawid, A. P., Stone, M., & Zidek, J. V. (1973). Marginalization paradoxes in Bayesian and structural inference. *Journal of the Royal Statistical Society. Series B*, 189-233.

Week 6

Godambe, V. P. (1982). Ancillarity principle and a statistical paradox. *Journal of the American Statistical Association* 77, 931-933.

Brown, L. (1967). The conditional level of Student's t test. *The Annals of Mathematical Statistics*, 38(4), 1068-1071.

Brown, L. D. (1990). An ancillarity paradox which appears in multiple linear regression. *The Annals of Statistics*, 471-493.

Week 7

Hannig, J., Iyer, H., Lai, R. C., & Lee, T. C. (2016). Generalized fiducial inference: A review and new results. *Journal of the American Statistical Association*, 111(515), 1346-1361.

Martin, R. (2025). Possibilistic inferential models: a review, arXiv:2507.09007.

Week 8

Tukey, J. W. (1962). The future of data analysis. *The annals of mathematical statistics*, 33(1), 1-67

Huber, P. J. (1964). Robust estimation of a location parameter. *The Annals of Mathematical Statistics*, 35(1), 73-101.

Week 9

James, W., & Stein, C. (1961). Estimation with quadratic loss. In *Proceedings of the fourth Berkeley symposium on mathematical statistics and probability*, 361-379.

Efron, B., & Morris, C. (1973). Stein's estimation rule and its competitors—an empirical Bayes approach. *Journal of the American Statistical Association*, 68(341), 117-130.

Week 10

Dempster, A. P., Laird, N. M., & Rubin, D. B. (1977). Maximum likelihood from incomplete data via the EM algorithm. *Journal of the royal statistical society. Series B (methodological)*, 1-38.

Efron, B. (1979). Bootstrap Methods: Another Look at the Jackknife. *The Annals of Statistics*, 7(1), 1-26.

Hall, P. (1988). Theoretical comparison of bootstrap confidence intervals. *The Annals of Statistics*, 927-953.

Week 11

Metropolis, N., Rosenbluth, A. W., Rosenbluth, M. N., Teller, A. H., & Teller, E. (1953). Equation of state calculations by fast computing machines. *The journal of chemical physics*, 21(6), 1087-1092.

Hastings, W. K. (1970). Monte Carlo sampling methods using Markov chains and their applications. *Biometrika*, 57(1), 97-109.

Gelfand, A. E., & Smith, A. F. (1990). Sampling-based approaches to calculating marginal densities. *Journal of the American statistical association*, 85(410), 398-409.

Week 12

Pearson, K. (1901). LIII. On lines and planes of closest fit to systems of points in space. *The London, Edinburgh, and Dublin philosophical magazine and journal of science*, 2(11), 559-572.

Hotelling, H. (1933). Analysis of a complex of statistical variables into principal components. *Journal of educational psychology*, 24(6), 417.

Cortes, C., & Vapnik, V. (1995). Support-vector networks. *Machine learning*, 20(3), 273-297.

Week 13

Valiant, L. G. (1984). A theory of the learnable. *Communications of the ACM*, 27(11), 1134-1142.

Aizerman, A., Braverman, E. M., & Rozoner, L. I. (1964) Theoretical foundations of the potential function method in pattern recognition learning. *Automation and remote control*, 25, 821-837

Breiman, Leo. (2001). Statistical modeling: The two cultures (with comments and a rejoinder by the author) *Statistical science* 16: 199-231.

Week 14

Rosenblatt, F. (1958). The perceptron: a probabilistic model for information storage and organization in the brain. *Psychological review*, 65(6), 386.

Rumelhart, D. E., Hinton, G. E., & Williams, R. J. (1986). Learning representations by back-propagating errors. *Nature*, 323(6088), 533-536.

Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A. N., ... & Polosukhin, I. (2017). Attention is all you need. *Advances in neural information processing systems*, 30.

Ho, J., Jain, A., & Abbeel, P. (2020). Denoising diffusion probabilistic models. *Advances in neural information processing systems*, 33, 6840-6851.

Generative AI: AI should help you think, not think for you. You may be able to use these tools to brainstorm ideas, research topics, and analyze problems, but you must decide what's appropriate and accurate. Engage responsibly with AI. You must evaluate AI-generated outputs for potential biases, limitations, inaccuracies, false output, and ethical implications. Do not put personal or confidential data into these tools. The use of AI must be open and documented. You should declare, explain, and cite any use of AI in the creation of your work using applicable standards (e.g., APA, MLA, course guidelines). Understand that you are ultimately 100% responsible for your final product. You are allowed to use the Gen AI to its full extend, however, you must read the papers yourself.

UNC Attendance Policy: No right or privilege exists that permits a student to be absent from any class meetings, even online classes, except for these university approved absences: authorized university activities, and disability/religious observance/pregnancy, as required by law and approved by Accessibility Resources and Service and/or the Equal Opportunity and Compliance Office (EOC). Significant health condition and/or personal/family emergency as approved by the Office of the Dean of Students, Gender Violence Service Coordinators, and/or the Equal Opportunity and Compliance Office (EOC).

Code of Conduct: All students are expected to adhere to University policy and follow the guidelines of the UNC Code of Conduct. Additional information can be found at <https://studentconduct.unc.edu/>.

Equal Opportunity and Compliance: Equal Opportunity and Compliance Accommodations Team ([Accommodations – UNC Equal Opportunity and Compliance](#)) receives requests for accommodations for disability, pregnancy and related conditions, and sincerely held religious beliefs and practices through the University's Policy on Accommodations. EOC Accommodations team determines eligibility and reasonable accommodations consistent with state and federal laws.

Counseling and Psychological Services: UNC-Chapel Hill is strongly committed to addressing the mental health needs of a diverse student body. The [Heels Care Network](#) website is a place to access the many mental health resources at Carolina. CAPS is the primary mental health provider for students, offering timely access to consultation and connection to clinically appropriate services. Go to the [CAPS website](#) or visit their facilities on the third floor of the Campus Health building for an initial evaluation to learn more. Students can also call CAPS 24/7 at 919-966-3658 for immediate assistance.

Title IX: Any student who is impacted by discrimination, harassment, interpersonal (relationship) violence, sexual violence, sexual exploitation, or stalking is encouraged to seek resources on campus or in the community. Reports can be made [online to the EOC](#) or by contacting the [University's Title IX Coordinator](#), Elizabeth Hall, or the [Report and Response Managers](#) in the Equal Opportunity and Compliance Office. Please note that I am designated as a Responsible Employee, which means I must report to the EOC any information I receive about the forms of misconduct listed in this paragraph. If you'd like to speak with a confidential resource, those include Counseling and Psychological Services, the University's Ombuds Office, and the [Gender Violence Services Coordinators](#). Additional resources are available at [safe.unc.edu](#).

Policy on Non-discrimination: The University is committed to providing an inclusive and welcoming environment for all members of our community and to ensuring that educational and employment decisions are based on individuals' abilities and qualifications. Consistent with this principle and applicable laws, the

University's [Policy Statement on Non-Discrimination](#) offers access to its educational programs and activities as well as employment terms and conditions without respect to race, color, gender, national origin, age, religion, sex, genetic information, disability, veteran's status, sexual orientation, gender identity or gender expression. Such a policy ensures that only relevant factors are considered, and that equitable and consistent standards of conduct and performance are applied.

If you are experiencing harassment or discrimination, you can seek assistance and file a report through the Report and Response Coordinators (email reportandresponse@unc.edu or see additional contact info at safe.unc.edu) or the [Equal Opportunity and Compliance Office](#). Please note that I am designated as a Responsible Employee, which means that I must report to the EOC any information I receive about harassment or discrimination. If you'd like to speak with a confidential resource, those include Counseling and Psychological Services and the University's Ombuds Office.

Accessibility Resources: UNC-Chapel Hill facilitates the implementation of reasonable accommodations for students with learning disabilities, physical disabilities, mental health struggles, chronic medical conditions, temporary disability, or pregnancy complications, all of which can impair student success. See the ARS website for contact and registration information: <https://ars.unc.edu/about-ars/contact-us>

Syllabus changes: The instructor reserves the right to make changes to the syllabus including project due dates and test dates. These changes will be announced as early as possible. It is your responsibility to attend classes and keep track of the proceedings.