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North Carolina State University
Raleigh, NC

Jonathan P Williams

PROFESSIONAL POSITIONS

Associate Professor (with tenure), Department of Statistics, NC State University 2025 -
Visiting Fellow, Centre for Adv. Study, Norwegian Academy of Science and Letters 2022 - 2023
Assistant Professor (tenure-track), Department of Statistics, NC State University 2019 - 2025
Research Collaborator, Mayo Clinic, Rochester, MN 2017 - 2020
Biostatistics Intern, Mayo Clinic, Rochester, MN Summer 2016
Statistical Consultant, Caster Concepts, Inc, Albion, MI 2011 - 2014

Associate Editor, *Journal of the American Statistical Association: Reviews* 2023 -
Associate Editor, *The American Statistician: Reviews* 2023 -

EDUCATION

University of North Carolina, Chapel Hill, NC 2014 - 2019
Department of Statistics and Operations Research
PhD Statistics
Advisor: Professor Jan Hannig

New York University, New York, NY 2012 - 2014
Courant Institute of Mathematical Sciences
MS Mathematics

FUNDING

8. AI-driven science: Valid statistical inference with regularization (2025). NC State College of Sciences Research Initiative Funds, **sole-PI, 3,000 USD**.
7. Statistical foundations for uncertainty quantification of machine intelligence assembled from generalized fiducial inference (2023-2024). NC State Faculty Research and Professional Development Fund, **sole-PI, 7,000 USD**.
6. Seed grant: Hidden Markov methodology for assessing racial stressors (2023-2024). NC State Data Science Academy, **PI, 50,000 USD**.
5. R56: Hidden Markov methodology for machine learning applied to identifying physiological states of shock in the intensive care unit via biomedical and unstructured text data (2021-2023). NIH R56HL155373, **sole-PI, 494,527 USD**.
4. REU site: Directed research for undergraduates in mathematics and statistics (DRUMS) (2024-2027). NSF 2051010, **Faculty Associate, 560,000 USD**.
3. REU site: Directed research for undergraduates in mathematics and statistics (DRUMS) (2024-2025). NSA H98230-20-1-0259 and H98230-21-1-0014, **Faculty Associate, 125,000 USD**.
2. REU site: Directed research for undergraduates in mathematics and statistics (DRUMS) (2021-2024). NSF 2051010, **Faculty Associate, 488,397 USD.**
1. REU site: Directed research for undergraduates in mathematics and statistics (DRUMS) (2021-2022). NSA H98230-20-1-0259 and H98230-21-1-0014, **Faculty Associate, 125,000 USD.**

PEER-REVIEWED PAPERS

† Graduate student working under my supervision

⋆ Undergraduate student working under my supervision

37. D Randahl, **J P Williams**, and H Hegre (202x). Bin-conditional conformal prediction of fatalities from armed conflict. **To appear in Political Analysis**.
36. E B Kendall†, **J P Williams**, G H Hermansen, F Bois, and V H Thanh (202x). Beyond time–homogeneity for continuous–time multistate Markov models. **To appear in Journal of Computational and Graphical Statistics**.
35. N Singer†, **J P Williams**, and S Ghosh (2025). Conformal prediction for astronomy data with measurement error. **Monthly Notices of the Royal Astronomical Society** 539 pp.1372–1380.
34. R Martin and **J P Williams** (2025). Asymptotic efficiency of inferential models and a possibilistic Bernstein–von Mises theorem. **International Journal of Approximate Reasoning** 180 pp.e109389.
33. V V Volpe, E B Kendall†, A N Collins, M G Graham, **J P Williams**, and S J Holochwost (2025). Prior exposure to racial discrimination and patterns of acute parasympathetic nervous system responses to a race-related stress task among black adults. **Psychophysiology** 62 (1) pp.e14713.
32. N Dey†, R Martin, and **J P Williams** (2024). Neil Dey, Ryan Martin, and Jonathan P Williams' contribution to the Discussion of "Safe Testing" by Grünwald, de Heide, and Koolen. **Journal of the Royal Statistical Society: Series B** 86 (5) pp.1147–1148.
31. N Dey†, M Singer†, S Sengupta, and **J P Williams** (2024). Word embeddings as statistical estimators. **Sankhyā B** 86 (part 2) pp.415–441.
30. J Hickey†, **J P Williams**, and E C Hector (2024). Transfer learning with uncertainty quantification: Random effect calibration of source to target (RECaST). **Journal of Machine Learning Research** 25 (338) pp.1–40.
29. A Hjort†, **J P Williams**, and J Pensar (2024). Clustered conformal prediction for the housing market. **Proceedings of the Thirteenth Symposium on Conformal and Probabilistic Prediction with Applications, in Proceedings of Machine Learning Research** 230 pp.366–386.
28. **J P Williams** and Y Liu (2024). Decision theory via model-free generalized fiducial inference. **Belief Functions: Theory and Applications. Lecture Notes in Computer Science (vol. 14909)**. Springer.
27. R Martin and **J P Williams** (2024). Large-sample theory for inferential models: A possibilistic Bernstein–von Mises theorem. **Belief Functions: Theory and Applications. Lecture Notes in Computer Science (vol. 14909)**. Springer.
26. **J P Williams**, G H Hermansen, H Strand, G Clayton, and H M Nygård (2024). Bayesian hidden Markov models for latent variable labeling assignments in conflict research: Application to the role ceasefires play in conflict dynamics. **Annals of Applied Statistics** 18 (3) pp.2034–2061.
25. N Giertych†, A Shaban, P Haravu⋆, and **J P Williams** (2024). A statistical primer on classical period-finding techniques in astronomy. **Reports on Progress in Physics** 87 (7) 078401 pp.1–18.
24. A Murph†, J Hannig, and **J P Williams** (2024). Introduction to generalized fiducial inference. **Handbook of Bayesian, Fiducial, and Frequentist Inference (1st ed.)**. Chapman and Hall/CRC.
23. M A Abba†, **J P Williams**, and B J Reich (2023). A penalized complexity prior for deep Bayesian transfer learning with application to materials informatics. **Annals of Applied Statistics** 17 (4) pp.3241–3256.
22. N Dey†, J Ding†, J Ferrell⋆, C Kapper⋆, M Lovig⋆, E Planchon⋆, and **J P Williams** (2023). Conformal prediction for text infilling and part-of-speech prediction. **New England Journal of Statistics in Data Science** 1 pp.69–83.

21. S Koner† and **J P Williams** (2023). The EAS approach to variable selection for multivariate response data in high-dimensional settings. **Electronic Journal of Statistics** 17 (2) pp.1947–1995.
20. **J P Williams**, Y Xie, and J Hannig (2023). The EAS approach for graphical selection consistency in vector autoregression models. **Canadian Journal of Statistics** 51 (2) pp.674–703.
19. **J P Williams**, D M Ommen, and J Hannig (2023). Generalized fiducial factor: An alternative to the Bayes factor for forensic identification of source problems. **Annals of Applied Statistics** 17 (1) pp.378–402.
18. **J P Williams** (2021). Discussion of "A Gibbs sampler for a class of random convex polytopes". **Journal of the American Statistical Association** 116 (535) pp.1198–1200.
17. S Nghiem, **J P Williams**, C Afoakwah, Q Huynh, S K Ng, and J Byrnes (2021). Can administrative health data improve the gold standard? Evidence from a model of the progression of myocardial infarction. **International Journal of Environmental Research and Public Health** 18 (14) pp.7385.
16. **J P Williams**, C B Storlie, T M Therneau, C R Jack Jr, and J Hannig (2020). A Bayesian approach to multi-state hidden Markov models: Application to dementia progression. **Journal of the American Statistical Association** 115 (529) pp.16–31.
15. **J P Williams** and J Hannig (2019). Non-penalized variable selection in high-dimensional linear model settings via generalized fiducial inference. **Annals of Statistics** 47 (3) pp.1723–1753.
14. E Sechi, E Shosha, **J P Williams**, S J Pittock, B G Weinshenker, B M Keegan, N L Zalewski, A S Lopez-Chiriboga, J Jitprapaikulsan, and E P Flanagan (2019). Aquaporin-4 and MOG autoantibody discovery in idiopathic transverse myelitis epidemiology. **Neurology** 93 (4) pp.e414–e420.
13. I Carmichael and **J P Williams** (2018). An exposition of the false confidence theorem. **Stat** 7 (1) pp.e201.
12. **J P Williams** and Y Lu (2015). Covariance Selection in the linear mixed effect model, **Journal of Machine Learning Research: Workshop and Conference Proceedings** 44 pp.277–291. (NIPS conference session)

Manuscripts in review

11. **J P Williams** (202x). Model-free generalized fiducial inference. **R&R Journal of Machine Learning Research**.
10. N Dey†, R Martin, and **J P Williams** (202x). Anytime–valid generalized universal inference on risk minimizers. **R&R Journal of the Royal Statistical Society: Series B**.
9. N Dey†, R Martin, and **J P Williams** (202x). Multiple testing in generalized universal inference. **In review**.
8. J Hickey†, **J P Williams**, B J Reich, and E C Hector (202x). Multivariate and online transfer learning with uncertainty quantification. **In review**.
7. M A Abba†, **J P Williams**, and B J Reich (202x). A Bayesian shrinkage estimator for transfer learning. **In review**.
6. A Hjort†, G H Hermansen, J Pensar, and **J P Williams** (202x). Uncertainty quantification in automated valuation models with locally weighted conformal prediction. **In review**.
5. N Dey† and **J P Williams** (202x). Valid inference for machine learning model parameters. **In review**.
4. Y Liu, Y Sung, **J P Williams**, and J Hannig (202x). Calibrated Bayesian inference. **In review**.
3. A Murph†, C B Storlie, P M Wilson, **J P Williams**, and J Hannig (202x). Bayes Watch: Bayesian change–point detection for process monitoring with fault detection. **In review**.

2. A Murph[†], J Hannig, and **J P Williams** (202x). Generalized fiducial inference on differentiable manifolds. **In review**.

1. I Carmichael, T Keefe, N Giertych[†], and **J P Williams** (202x). yaglm: A Python package for fitting and tuning generalized linear models that supports structured, adaptive and non-convex penalties. **In progress, but manuscript available on my website**.

PRESENTATIONS

39. Transfer learning with uncertainty quantification: Random effect calibration of source to target (RECaST). *Joint Statistical Meeting*, Nashville, TN, August 2025.
38. Topics in modern HMMs: Time-inhomogeneity and applications to conflict research. *CANSSI CRT Workshop on HMMs*, Department of Statistics, University of British Columbia, February 2025.
37. Imprecision in statistical learning. *Seminar*, Department of Statistics and Data Science, Cornell University, February 2025.
36. Imprecision in decision theory. *IMS International Conference on Statistics and Data Science*, Nice, France, December 2024.
35. Anytime-valid generalized universal inference on risk minimizers. *Conference on Statistical Learning and Data Science*, Newport Beach, CA, November 2024.
34. Large-sample theory for inferential models: A possibilistic Bernstein–von Mises theorem. *8th International Conference, BELIEF*, Belfast, UK, September 2024.
33. Decision theory via model-free generalized fiducial inference. *8th International Conference, BELIEF*, Belfast, UK, September 2024.
32. Model-free generalized fiducial inference for empirical risk minimizers. *Joint Statistical Meeting*, Portland, OR, August 2024.
31. Model-free generalized fiducial inference for empirical risk minimizers. *2024 WNAR/IMS/Graybill Annual Meeting*, Colorado State University, June 2024.
30. A tutorial on conformal prediction and new ideas for model-free statistical inference. *Seminar*, Department of Psychology, University of Maryland, March 2024.
29. Model-free generalized fiducial inference. *Seminar*, Department of Statistics, North Carolina State University, March 2024.
28. Multistate Markov models: Application to dementia progression. *16th International Conference of the ERCIM WG on Computational and Methodological Statistics (CMStatistics 2023)*, HTW Berlin, University of Applied Sciences, Berlin, Germany, December 2023.
27. R package: HMMs for conflict research. *Uncertainty of Forecasting Fatalities in Armed Conflict Research Kitchen*, Peace Research Institute Oslo (PRIO), Oslo, Norway, December 2023.
26. Discussion of "Imprecise probability in statistics: why imprecision is needed, where it comes from, and how it's beneficial". *Seminar*, Department of Statistics, North Carolina State University, October 2023.
25. Discussion of topic-contributed session on astrostatistics. *Joint Statistical Meeting*, Toronto, Canada, August 2023.
24. Model-free generalized fiducial inference. *Eighth Bayesian, Fiducial, and Frequentist Conference*, University of Cincinnati, May 2023.
23. Model-free generalized fiducial inference. *Seminar Series in Statistics and Data Science*. Department of Mathematics, University of Oslo, Norway, December 2022.
22. Introduction to conformal-based uncertainty quantification and applications to automated valuation models. *CAS Workshop: Prediction with Uncertainty*, Oslo, Norway, December 2022.

21. Tutorial on conformal prediction, and a new idea. *Seminar*, Norwegian Computing Center, Oslo, Norway, December 2022.
20. Hidden Markov model applications for conflict data. *CAS Workshop: From Processes to Models*, Oslo, Norway, October 2022.
19. Conformal predictors constructed from generalized fiducial inference. *Joint Statistical Meeting*, Washington, DC, August 2022.
18. The role of Bayesian hidden Markov models in conflict research. *Pre-CAS Workshop on Stability and Change*, Oslo, Norway, May 2022.
17. Research experience at NC State University for undergraduate students. *Seminar*, Department of Mathematics, High Point University, October 2021.
16. Discussion of "A Gibbs sampler for a class of random convex polytopes". *JASA T&M Invited Session, Joint Statistical Meeting*, Seattle, WA, August 2021.
15. Generalized fiducial factor: An alternative to a Bayes factor for forensic identification of source problems. *Joint Statistical Meeting*, Seattle, WA, August 2021.
14. A Bayesian hidden Markov model framework for monitoring and diagnosing critically ill hospital patients. *28th Nordic Conference in Mathematical Statistics*, Tromsø, Norway, June 2021.
13. Generalized fiducial factor: An alternative to a Bayes factor for forensic identification of source problems. *BFF 6.5 – Virtual Workshop on Bayesian, Fiducial, and Frequentist Statistical Inference*, virtual conference hosted on https://researchers.one/, February 2021.
12. The EAS approach for graphical selection consistency in vector autoregression models. *12th International Conference of the European Research Consortium for Informatics and Mathematics Working Group on Computational and Methodological Statistics (CMStatistics)*, University of London, UK, December 2019.
11. The EAS approach for graphical selection consistency in vector autoregression models. *Sixth Bayesian, Fiducial, and Frequentist Conference on Model Uncertainty*, Duke University and SAMSI, May 2019.
10. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *Seminar*, Department of Statistics, University of Florida Gainesville, January 2019.
9. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *Seminar*, Department of Statistics, Iowa State University, January 2019.
8. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *Seminar*, Department of Statistics, University of Illinois Urbana–Champaign, December 2018.
7. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *Seminar*, Department of Statistics, North Carolina State University, December 2018.
6. Non-penalized variable selection via generalized fiducial inference. *Graduate Seminar*, Department of Statistics and Operations Research, UNC Chapel Hill, November 2018.
5. Non-penalized variable selection via generalized fiducial inference. *AISC 2018 International Conference on Advances in Interdisciplinary Statistics and Combinatorics*, UNC Greensboro, October 2018.
4. Non-penalized variable selection in high-dimensional settings via generalized fiducial inference. *27th Nordic Conference in Mathematical Statistics*, Tartu, Estonia, June 2018.
3. A Bayesian approach to multi-state hidden Markov models: Application to dementia progression. *Graduate Seminar*, Department of Statistics and Operations Research, UNC Chapel Hill, September 2017.
2. Non-penalized variable selection in high-dimensional linear model settings via generalized fiducial inference. *Graduate Seminar*, Department of Statistics and Operations Research, UNC Chapel Hill, February 2017.

1. A Bayesian approach to multi-state hidden Markov models: Application to dementia progression. *Tea Time for Science*, Biomedical Statistics and Informatics, Health Sciences Research, Mayo Clinic, Rochester, MN, August 2016.

POSTER PRESENTATIONS

7. A Bayesian hidden Markov model framework for monitoring and diagnosing critically ill hospital patients. *Seventh Bayesian, Fiducial, and Frequentist Conference*, University of Toronto, Canada, May 2022.
6. A statistical primer on classical methods for exoplanet detection. *Statistical Challenges in Modern Astronomy VII conference*, virtual conference, June 2021.
5. Non-penalized variable selection via generalized fiducial inference. *Recycled Poster Session of the North Carolina Chapter of the American Statistical Association*, SAS Campus, NC, September 2019.
4. Non-penalized variable selection via generalized fiducial inference. *Fifth Bayesian, Fiducial, and Frequentist Conference*, University of Michigan Ann Arbor, May 2018.
3. Generalized fiducial inference for high dimensional problems. *Invited Poster Session, Joint Statistical Meeting*, Baltimore, MD, July 2017.
2. Non-penalized variable selection in high-dimensional linear model settings via generalized fiducial inference. *Fourth Bayesian, Fiducial, and Frequentist Conference*, Harvard University, May 2017.
1. Covariance Selection in the Linear Mixed Effect Model. *Feature Extraction: Modern Questions and Challenges, Neural Information Processing Systems*, Montreal, Canada, December 2015.

AWARDS

- Thank-a-Teacher Award, NCSU — 2022
- LeRoy and Elva Martin Award for Teaching Excellence — 2021 - 2022
- Best poster award, *Recycled Poster Session of the NC ASA* — September 2019
- Graduate Student Travel Grant – 1,000 USD — Summer 2018
- Carl M. Erikson Mathematics Department Scholarship — 2011 - 2012
- Regents Scholarship — 2009 - 2012
- National Scholars Program Scholarship — 2008 - 2012
- Leader Award Scholarship — 2009 - 2011

TEACHING AND ADVISING

Courses taught (†courses designed):

- †Bayesian computations for machine learning (grad; DSA 595 NCSU) — Spring '25
- †Navigating the PhD program and beyond (grad; ST 790 NCSU) — Fall '24, '25
- †Adv. computing for stat. reasoning (undergrad; ST 453 NCSU) — Spring '22, '23, '24, Fall '24
- Intro. to math. stat. I (undergrad; ST 421 NCSU) — Fall '24, '25
- Intro. to prob. and dist. theory (undergrad; ST 371 NCSU) — Fall '20
- Linear models (grad; ST 705 NCSU) — Spring '20, '21, '22, '23, '24, '25
- Fundamentals of statistical inference II (grad; ST 502 NCSU) — Fall '19
- STOR-BIOS grad student boot camp (real analysis section; UNC) — Summer '17
- Intro. to statistics (first year undergrad; STOR 155 UNC) — Spring '16, Fall '16

PhD students advised/co-advised:

8. Ananya Roy (NCSU; expected graduation Spring 2029)

7. Naomi Singer (NCSU; expected graduation Summer 2025)
6. Emmett Kendall, PhD, NCSU – Currently tenure-track Assistant Professor at UT Dallas 2025
5. Neil Dey, PhD, NCSU – Currently machine learning engineer at Google 2025
4. Jimmy Hickey, PhD, NCSU – Currently at Optum 2024
3. Mohamed Abba, PhD, NCSU – Currently at Amazon 2023
2. Alexander Murph, PhD, UNC Chapel Hill – Currently at Los Alamos National Lab 2023
1. Salil Koner, PhD, NCSU – Currently tenure-track Assistant Professor at UC Riverside 2021

PhD committees served on:

10. Jisu Oh (NCSU; expected graduation Summer 2027)
9. Shuvrarghya Ghosh (NCSU; expected graduation Summer 2027)
8. Matthew Singer (NCSU; expected graduation Summer 2025)
7. Ian Grace (NCSU; expected graduation TBD)
6. Alvin Sheng, PhD, NCSU 2024
5. Xinyu Zhang, PhD, NCSU 2024
4. Annie Tang, PhD, NCSU 2023
3. Kang Wang, PhD, NCSU 2023
2. Yin-Jen Chen, PhD, NCSU 2022
1. Pei-Shien Wu, PhD, NCSU 2022

Undergraduate students mentored:

10. Aditya Basarkar (NCSU; expected graduation 2026)
9. Madeline Mariano (Rochester Institute of Technology; REU student 2024)
8. Adam Ousherovitch (University of California, Berkley; REU student 2024)
7. Natalia Velez-Rios (Vasser College; REU student 2024)
6. Fiona Romanoschi (University of Texas, Austin; REU student 2024)
5. Jack Ferrell (University of Florida; REU student 2021)
4. Carolina Kapper (High Point University; REU student 2021)
3. Maxwell Lovig (University of Louisiana, Lafayette; REU student 2021)
2. Emiliano Planchon (NCSU; REU student 2021)
1. Pragya Haravu (NCSU 2023)

DEPARTMENT SERVICE

- Data science committee NCSU 2025-2026
- PhD program committee NCSU 2024-2025, 2025-2026
- Admissions committee NCSU 2023-2024
- Search committee NCSU 2022-2023
- Seminar committee NCSU Spring 2021, Fall 2021
- Qualifying exam committee NCSU Aug '20, '23, '24, Jan '21, '22

UNIVERSITY SERVICE

- Advisory board (Statistics rep.) for Foundations of Data Science Masters Program 2025-

PROFESSIONAL SERVICE

- Organizer of a topic-contributed session on astrostatistics. *Joint Statistical Meeting*, Toronto, Canada, August 2023.
- Organizer of a contributed session on hidden Markov models. *28th Nordic Conference in Mathematical Statistics*, Tromsø, Norway, June 2021.
- Chair of a contributed session on valid and flexible inference. *Joint Statistical Meeting*, Portland, OR, August 2024.
- Chair of a session on complex inference problems in data science. *12th International Conference of the European Research Consortium for Informatics and Mathematics Working Group on Computational and Methodological Statistics (CMStatistics)*, University of London, UK, December 2019.
- Chair of a session on forensic statistics. *International Chinese Statistical Association Applied Statistics Symposium*, Raleigh, NC, June 2019.
- Reviewer for *National Science Foundation* 1 proposal
- Referee for *Journal of the Royal Statistical Society: Series B* 2 manuscripts
- Referee for *Journal of the American Statistical Association: Theory and Methods* 4 manuscripts
- Referee for *Pattern Recognition* 1 manuscript
- Referee for *Statistical Science* 1 manuscript
- Referee for *Sankhyā A* 1 manuscript
- Referee for *Statistics in Medicine* 1 manuscript
- Referee for *Biometrics* 2 manuscripts
- Referee for *Journal of Computational and Graphical Statistics* 4 manuscripts
- Referee for *International Journal of Approximate Reasoning* 2 manuscripts
- Referee for *Machine Learning* 1 manuscript
- Referee for *Scandinavian Journal of Statistics* 1 manuscript
- Referee for *Journal of Statistical Planning and Inference* 1 manuscript
- Referee for *Statistical Methods in Medical Research* 2 manuscripts
- Referee for *The American Statistician* 1 manuscript
- Referee for *Statistics & Probability Letters* 1 manuscript
- Referee for *Stat* 6 manuscripts
- Referee for *The New England Journal of Statistics in Data Science* 1 manuscript
- Referee for *SCIENCE CHINA Mathematics* 2 manuscripts
- Referee for *CRC Press* 1 manuscript
- Referee for *Communications in Statistics: Theory and Methods* 1 manuscript
- Referee for *British Journal of Mathematical and Statistical Psychology* 1 manuscript
- Referee for *SIAM/ASA Journal on Uncertainty Quantification* 1 manuscript
- Referee for *PLOS ONE* 1 manuscript
- Referee for *Statistical Modelling* 1 manuscript
- Referee for *Negotiation Journal* 1 manuscript
- Referee for *Computers* 1 manuscript
- Referee for *Mathematics* 1 manuscript
- Referee for *Stats* 1 manuscript