Amy Mann

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Education

University of Oxford, Rhodes Scholar Oct 2025 – Aug 2026
M.Sc., Statistical Science (Expected)

University of Toronto Sept 2021 – Apr 2025
B.Sc. Hons, Mathematics & Statistics; 3.99 GPA 3rd/4th-year, 3.83 GPA overall

Research Experience

Research Assistant, Bayesian Demography Lab June 2025 – Present
Assessing the quality of mortality data in low-mortality contexts

- Working with Prof. Monica Alexander (U of T) and Prof. Matthew Kiang (Stanford) to develop tools to measure the quality of mortality data in high-income settings at a local level and examine geographic trends in U.S. data quality since 1999
- Developed an entropy-based index (using Kullback-Leibler divergence) to quantify informational gain about the underlying cause of death from the contributing causes on death certificates.
- Built a classification model to reassign garbage-coded underlying causes using contributing-cause and demographic features
- Found that while overall U.S. data quality improved (1999–2022), garbage codes became harder to reassign, indicating shifting coding behavior
- Proposed an effective number of causes metric to compare coding diversity across geographies and time; manuscript submitted to PAA conference and in process of submitting to journal

Research Assistant, Artificial Intelligence and Mathematical Modelling Lab May 2024 – Jan 2025
Temperature-dependent model of malaria transmission in Cameroon

- Developed climate-driven host–vector models of malaria to predict the malaria transmission risk/outbreak risk in current and future temperature conditions in Cameroon
- Used MCMC estimation in Stan to determine epidemiological parameters
- Studied parameter identifiability in epidemiological models using physics-informed neural networks (PINNS)

Research Fellow, Fields Institute for Research in Mathematical Sciences June 2023 – Aug 2023
Random walks on spectral graphs

- Studied Kemeny's constant and related random walk parameters on a team with Dr. Jane Breen, Dr. Ada Chan, Dr. Sooyeong Kim, and students Andrei Parfeni and Giovanni Tedesco
- Studied Kemeny's constant on threshold graphs, which are an interesting family of graphs with properties that make examining Kemeny's constant difficult; that is, they are usually not regular, not acyclic, and not 1-connected
- Examined algebraic and combinatorial approaches to the problem. I specifically focused on combinatorial approaches and proved some of the results in section 4 of the paper (identified below).

Laidlaw Scholar, Kent Moore Group, University of Toronto July 2022 – Dec 2022
Mapping the back-trajectory of sea ice in the Last Ice Area

- Built Python code to compute and map back-trajectories of sea ice using velocity fields to study movement of sea ice in the Last Ice Area; in process of turning into a paper

Research Fellow, Natalia Krasnopolskaia Undergraduate Research Fellow, Wunch Group May 2022 – July 2022
Research Assistant

- Calibrated and deployed a network of air quality sensors in the GTA to measure PM2.5
- Created a website in HTML with Stephanie Gu to make the data and findings accessible to the public

Research Assistant, Prairie Climate Centre, Winnipeg, Manitoba Sept 2020 – Dec 2021
Loss of Cold Weather in the Canadian Arctic

- Quantified and mapped the loss of cold days in the Arctic since 1950 and examined the cultural and economic effects of the loss of cold on Arctic communities

Publications

Academic publications

- Breen, J., Kim, S., Fung, A. L., **Mann, A.**, Parfeni, A. A., & Tedesco, G. (2025). "Threshold graphs, Kemeny's constant, and related random walk parameters." *Linear Algebra and Its Applications*.
- Gillespie, L. D., Ars, S., Williams, J. P., Klotz, L., Feng, T., Gu, S., Kandapath, M., **Mann, A.**, et al. (2023). "A Modified Gaussian Plume Model for Mobile in situ Greenhouse Gas Measurements." *Atmos. Meas. Tech.* (preprint)
- Blair, D., **Mann, A.**, Mhanni, H., Soussi, S., & Loxley, M. (2021). "Not Cool: On the Loss of Cold Weather in the Canadian Arctic." *Atmosphere-Ocean*, 59(2), 93–106.

Working papers

- **Mann, A.**, Alexander, M., & Kiang, M. "Geographic variation in the quality of U.S. mortality data, 1999-2022." (submitted to Population Association of America Annual Meeting).
- **Mann, A.**, Han, Q., Iyaniwura, S., & Kong, J. "Temperature-driven model of malaria transmission in Cameroon." (working paper).

Presentations

"Temperature-dependent modeling of malaria transmission." Mathematical Modeling and Artificial Intelligence General Meeting, Dalla Lana School of Public Health, 2024.

"Spectral graph invariants and random walks on graphs." (with A. Parfeni and G. Tedesco). The Fields Institute for Research in Mathematical Sciences, 2024.

"Calibrating and deploying low-cost particulate matter sensors in the Greater Toronto Area." University of Toronto Physics Research Symposium, 2022.

"Local Rates of Warming Across Canada Relative to Global Warming." Prairie Canadian Association of Geographers (PCAG) 44th Annual Meeting, 2021.

"Prairie Climate Centre and Climate Atlas Demo" (with D. Blair). Canadian Meteorological and Oceanographic Society (CMOS) 55th Congress, 2021.

Teaching

Linear Algebra I, University of Toronto, *Teaching Assistant* — Fall 2024

Introduction to Ordinary Differential Equations, University of Toronto, *Teaching Assistant* — Winter 2025

Funding and Awards

Rhodes Scholarship, 2025.

Fields Undergraduate Summer Research Fellowship, 2022

Laidlaw Scholar Research Fellowship, 2022

Natalia Krasnopolskaia Undergraduate Research Fellowship, UofT Physics Department, 2021

University of Toronto National Scholarship, 2021 (full ride scholarship to the University of Toronto; one of eleven recipients in Canada)

Schulich Leadership Scholarship (decline for UofT National Scholarship), 2021

Paul Simpson-Housley Award for Best Student Presentation, 2021

Leacross Foundation Arctic Scholarship, 2020

Skills

Programming: Python, R, Stan, MATLAB, C/C++, Java, LaTeX, HTML

Languages: Proficient French

Selected Coursework

Math: Measure-theoretic probability theory, real analysis, optimization, partial differential equations, dynamical systems, numerical methods, graph theory, combinatorial methods, group theory, ring theory, algebraic number theory

Statistics: High-dimensional statistics, Bayesian statistics, graphical models, statistical machine learning

Service & Leadership

President, Math Union (Apr 2024 - Apr 2025): organized colloquia, mentorship events, and launched an undergraduate journal.

Board Member, Victoria University Board of Regents (Apr 2023 - Apr 2025).

Co-President, Victoria College Community Garden (Nov 2023 - Aug 2025).

Pursue STEM Program Facilitator (2023, 2024): mentored and tutored high school students in the GTA

Outreach Worker, The Common Table Drop-in Program — Church of the Redeemer (Jan 2024 – Jul 2025).

Vice President, Physics Student Union (Apr 2022 – Apr 2023).