Jason Liu

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Education

Rutgers University, New Brunswick September 2023 – Present
B.S. in Mathematics and Computer Science GPA: 3.979
Graduate coursework: Real Analysis 1,2 (Folland); Statistical Inference 1,2; Math. Physics; Algorithms
In progress (graduate): Advanced Statistical Theory, Functional Analysis, PDE theory

Research Interest

Empirical processes, nonparametric estimation, minimax theory, optimal transport, applied analysis

Research Experience

Summer Undergraduate Applied Mathematics Institute (SUAMI) May 2026 – July 2026
Mentor: Dr. Matthew Rosenzweig Carnegie Mellon University

- Selected for an eight-week intensive research program in applied mathematics (12 students nationally)
- Topic: Wasserstein gradient flows of the maximum mean discrepancy. Proposed a nonlocal jump term that guarantees convergence of solutions; proved far-field exponential convergence.

Research Assistant in Mathematical Statistics June 2025 – Present
Mentor: Dr. Min Xu Rutgers University

- Led a project on estimating the sub-Gaussian parameter from problem formulation through theory and writing; first-authored the resulting manuscript (submitted to AISTATS 2027)

Research Assistant in Computational Genetics June 2022 – Present
Mentors: Dr. Jinchuan Xing and Dr. Min Xu Rutgers University

- Led a genomics research project from conception to publication, designing novel analysis pipelines for processing and interpreting biological data

Journal Publication

1. Biswas, L., Tyc, K., Aboelenain, M., Sun, S., Dundović, I., Vukušić, K, Liu, J., Guo, V., Xu, M., Scott, R., Tao, X., Tolić, I., Xing, J., Schindler, K. (2024 July) Maternal genetic variants in kinesin motor domains prematurely increase egg aneuploidy, *Proceedings of the National Academy of Sciences.* [Featured in Rutgers Today]

Pre-print/Under Review

1. Desai, A., Liu, J., Roplekar, S., Rosenzweig, M. (2026 October) A Jump-Modified Wasserstein Gradient Flow for Maximum Mean Discrepancy with Energy Kernels. (arXiv)
2. Liu, J., Xu, M., Xing, J. (2026 October) Estimation of the sub-Gaussian Parameter. *submitted to AISTATS 2027.* (arXiv)
3. Liu, J., Xu, M., Xing, J. (2026 April) Beyond Single Algorithms: A Framework for Aggregating Active Modules in Genetic Interaction Networks, *submitted to AJHG.* (bioRxiv)

Conference Presentation

1. Liu, J., Xu, M., Xing, J. (2026 October) Extreme p-value estimation for large-scale permutation tests via the sub-Gaussian tail inequality. MABC 2026, Philadelphia, PA.
2. Liu, J., Xu, M., Xing, J. (2025 November) A Novel Algorithm for Active Module Aggregation based on the Earth Mover's Distance. MABC 2025, Philadelphia, PA.
3. Liu, J., Xu, M., Xing, J. (2025 October) Systematic assessment of active active module identification algorithms. ASHG 2025, Boston, MA.
4. Liu, J., Mao, W., Zhu, H. (2025 April) LLM World Models for Efficient Exploration in Automated Theorem Proving. 21st Aresty Undergraduate Research Symposium, Piscataway, NJ.

5. Zeng, W., Xu, J., Liu, J., Marin, D., Treff, N., Xing, J. (2024 October) Identification and prioritization of candidate genes associated with aneuploidy using PGT-A data. MABC 2024, Philadelphia, PA.
6. Liu, J., Xu, M., Xing, J. (2024 October) Systematic assessment of active module identification algorithms. MABC 2024, Philadelphia, PA.
7. Liu, J., Xu, M., Schindler, K., Xing, J. (2023 October) Using PAPER to identify active modules in an aneuploidy dataset. MABC 2023, Philadelphia, PA.
8. Liu, J., Sun, S., Xing, J. (2022 October) Predicting embryonic aneuploidy rate and identifying candidate genes in IVF patients using synonymous variants. MABC 2022, Philadelphia, PA.

Talks

1. **How hard is an estimation problem?** *Rutgers Undergrad Math Seminar* (November 2026).
2. **Aggregation of active module identification algorithms.** *Research in Progress Seminar*, Department of Genetics, Rutgers University (December 2025).
3. **Conformal mappings and the Riemann mapping theorem.** *Directed Reading Program*, Department of Mathematics, Rutgers University (May 2025) (Honorable Mention).
4. **Extracting biological insights from gene networks.** *Joint epigenetics group meeting*, Department of Genetics, Rutgers University (April 2025).
5. **Systematic assessment of active module identification algorithms.** *Research in Progress Seminar*, Department of Genetics, Rutgers University (January 2025).
6. **The Weierstrass factorization theorem.** *Directed Reading Program*, Department of Mathematics, Rutgers University (December 2024).
7. **Predicting embryonic aneuploidy rate and identifying candidate genes in IVF patients using synonymous variants.** *Lightning Talk*, MABC 2022 (October 2022) [Trainee Award].

Teaching Experience

- **Peer Instructor** at the Aresty Research Center at Rutgers University (9/2025 – 5/2026)
- **Grader** for Honors Calculus III (Math 291), Rutgers Dept. of Mathematics (9/2024 – 12/2024)
- **Tutor** for middle and high school students, PALS Learning Center (8/2023 – 7/2024)

Awards and Honors

- **The Maurice M. and Adrienne R. Weill Mathematics Scholarship**, Rutgers Math (2026)
- **The John Bogart Prize**, Rutgers Math (2026)
- **The Alan Marc Schreiber Memorial Scholarship**, Rutgers University (2025, 2026)
- **The Paul Robeson Centennial Scholar Award**, Rutgers University (2025)
- **The Rutgers College Scholarship**, Rutgers University (2025)
- **The David and Dorothy Bernstein Endowed Scholarship**, Rutgers University (2024)

Service

- **Mentorship:** Jakub Minkiewicz, Ellie Lu
- **Volunteer data analysis:** Barr lab (Wang et al. 2024)
- **Website manager:** Xing lab, TIC Genetics

Technical Skills

- **Programming Languages:** Python (`pytorch` and `pandas`), UNIX Shell, R, Java, C++
- **Other Technical Skills:** Statistical analysis, Machine learning, Web development
- **Languages:** English (Native), Mandarin (Fluent)

Other Interests

Piano, cooking, hiking, and running