Sunny (Hanqi) Shi

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Education

Swarthmore College, B.A. in Statistics and Computer Science (GPA: 3.98/4.0) Expected May 2027

- **Past Coursework:** Statistical Learning and Data Mining, Mathematical Statistics I (A+) & II, Real Analysis, Complex Analysis, Differential Equations (A+), Empirical Models in Marketing (PhD-level, The Wharton School, A), Data Structures and Algorithms (A+), Intro to Computer Systems (A+)
- **Current Coursework:** Artificial Intelligence, Differential Privacy

Research Experience

Influenza Hospitalization Prediction using Google Search Data May 2025 – Present
with Prof. S. Ning and K. Hikino, Swarthmore College

- Develop and evaluate regularized autoregressive models to predict weekly influenza hospitalization rates using high-dimensional Google Search query data (140+ features) on national and state levels.
- Explore multiple strategies for incorporating information sharing from cross-state activities and lagged influenza activity levels.
- Investigate and test imputation methods to address data insufficiency during COVID-19, evaluating robustness of model performance across extended time periods.

Bayesian Inference for the Wishart Distribution Dec 2026 – Present
with Prof. P. Everson, Swarthmore College

- Develop an efficient rejection sampling algorithm to generate independent draws from the posterior distribution of Wishart parameters.
- Prove correctness of the sampling algorithm through analysis of completely monotonic functions.
- Validate algorithm through simulations, demonstrating high acceptance rates and nearly nominal convergence probability across varying matrix dimensions.

The Local-Global Conjecture is False for Generalized Circle Packings May 2024 – Aug 2024
with Prof. I. Whitehead, W. Shi, H. Williams-Tracy, and J. Zhang, Swarthmore College

- Revise and Resubmit, *Journal of Number Theory* [Preprint]
- Extended the obstruction to the local–global conjecture to six new classes of generalized circle packings.
- Developed proofs drawing from complex analysis, quadratic reciprocity, modular arithmetic, and group theory.
- Generated computational evidence of integers up to 120,000,000 in C++ and Python to support our proof.

Presentations

Sigma Xi Poster Session, Swarthmore College Sep 2024 & Sep 2025

The Local-Global Conjecture for Generalizations of Apollonian Circle Packings is Also False. AMS Special Session on Local-to-Global in Apollonian Circle Packings and Beyond, Joint Mathematics Meetings Jan 2025

PME Undergraduate Student Poster Sessions, Joint Mathematics Meetings Jan 2025

Internship Experience

Strategic Investment Intern, Xiaohongshu (Rednote) – Shanghai, China Jun 2025 – Aug 2025

- Conducted research on AI applications in digital platforms and consumer hardware; produced 30+ industry briefs for the investment team.
- Evaluated prospective portfolio companies and contributed to investment memos and due diligence analysis.

Honors and Awards

First Place (Site Champion), ICPC North America Mid-Atlantic Regional, Division 2 — Wilkes University Site — Oct 2025

Fourth Place (Regional Ranking), ICPC North America Mid-Atlantic Regional, Division 2 — Overall Region

First Place, Philadelphia Tri-College & Extended Region Annual Team Olympics of Math Problem Solving — Feb 2025

Associate Member, Sigma Xi Scientific Research Honor Society — Nov 2024 - Present

The Morris Monsky Prize in Mathematics — May 2024

National Merit Scholarship Finalist — May 2023

Leadership & Service

Swarthmore Mathematics & Statistics Department Teaching Assistant — Sep 2024 - Present
- 2025-2026: statistical methods I & II, probability, and mathematical statistics I & II
- 2024-2025: multi-variable calculus

Swarthmore Writing Center Writing & Speaking Tutor — Sep 2024 - Present

Grader, Swarthmore Computer Science Department — Sep 2025 - Present

Board Member, Swarthmore Gender Minorities in Mathematics & Statistics — Nov 2024 - Present

Treasurer, Swarthmore Badminton Club — Sep 2024 - Present

Member, Swarthmore 180DC Consulting Club — Sep 2025 - Present

Skills

Programming & Data Analysis: Python, R, C/C++, Stata, SQL
Web: HTML/CSS, JavaScript
Typesetting: LaTeX