Vilas Winstein

Probability Graduate Student

Education

PhD Candidate in Mathematics *2022-Present*
University of California, Berkeley

Specializing in probability theory, advised by Shirshendu Ganguly.
Partially funded by a National Science Foundation Graduate Research Fellowship.
Expected graduation in May 2027.

Fulbright Student *2020-2022*
Budapest Semesters in Mathematics

Coursework and research experience in graph limit theory, advised by Miklos Abert.
Partially funded by a Fulbright scholarship.

BS in Mathematics and Computer Science *2016-2020*
The Ohio State University

Senior Thesis: *Toward a Categorification of Biquandle Brackets*, advised by Sergei Chmutov.
Partially funded by a Barry Goldwater scholarship.

Publications and Preprints (authors listed alphabetically)

Renormalizing small ball events for branching random walk.
Vilas Winstein.
arXiv preprint 2609.17520.

Correlation decay in area-tilted line ensembles.
Shirshendu Ganguly, Vilas Winstein.
arXiv preprint 2608.05089.

The maximum-entropy median-martingale.
Rikhav Shah, Vilas Winstein.
Statistics and Probability Letters 241 (2027): 110956.

Wasserstein distance between ERGMs and Erdős–Rényi models.
Vilas Winstein.
arXiv preprint 2601.14170.

Approximate FKG inequalities for phase-bound spin systems,
with applications to central limit theorems for exponential random graphs.
Satyaki Mukherjee, Vilas Winstein.
arXiv preprint 2601.07169, revision requested from Annales de l'Institut Henri Poincaré D.

Decoupling of clusters in independent sets in a percolated hypercube.
Mriganka Basu Roy Chowdhury, Shirshendu Ganguly, Vilas Winstein.
arXiv preprint 2511.07350, to appear in SIAM Journal on Discrete Mathematics.

Quantitative central limit theorems for exponential random graphs.
Vilas Winstein.
arXiv preprint 2507.10531, to appear in Transactions of the American Mathematical Society.

Concentration via metastable mixing,
with applications to the supercritical exponential random graph model.
Vilas Winstein.
The Annals of Applied Probability 36.04 (2026): 3661-3706.

Gaussian to log-normal transition for independent sets in a percolated hypercube.
Mriganka Basu Roy Chowdhury, Shirshendu Ganguly, Vilas Winstein.
Random Structures and Algorithms 96.04 (2026): e70101.

Regularity based spectral clustering and mapping the Fiedler-carpet.
Fatma Abdelkhalek, Marianna Bolla, Frank Siedl, Vilas Winstein, Tao You.
Special Matrices 10.1 (2022): 394-416.

Categorifying Biquandle Brackets.
Adu Vengal, Vilas Winstein.
Journal of Knot Theory and its Ramifications 31.07 (2022): 2250052.

The Structure of Biquandle Brackets.
Will Hoffer, Adu Vengal, Vilas Winstein.
Journal of Knot Theory and its Ramifications 29.06 (2020): 2050042.

Invited talks

JMM 2027 AMS Special Session on Discrete Random Structures	*January 12, 2027*
Berkeley–Stanford Probability Day	*November 13, 2026*
Ross Program $\mathbb{RP}^2$ Colloquium	*October 3, 2026*
University of North Carolina IDEAS Seminar	*August 20, 2026*
IMS workshop on "CFTs: Randomness and Geometry"	*May 29, 2026*
Stanford University Probability Seminar	*April 27, 2026*
University of Victoria Probability and Dynamics Seminar	*March 31, 2026*
MIT Probability Seminar	*March 16, 2026*
UC Davis Probability Seminar	*January 13, 2026*
UC Berkeley MUSA Math Monday	*October 13, 2025*
National University of Singapore Combinatorics Seminar	*July 29, 2025*

National University of Singapore Probability Seminar *July 25 & 28, 2025*
Indian Institute of Science APRG Seminar *July 16, 2025*
Alfréd Rényi Institute of Mathematics Kutszem *June 16, 2025*
Budapest Semesters in Mathematics Colloquium *June 12, 2025*
UC Berkeley Probability Seminar *September 25, 2024*

Employment

Teaching Assistant *2023-Present*
University of California, Berkeley

Math 53 (Multivariable Calculus) with Edward Frenkel *Fall 2026*
Math W54 (Linear Algebra and Differential Equations) with Arun Sharma *Summer 2026*
Math 126 (Partial Differential Equations) with Gregory Parker *Spring 2026*
Math 98 (MATLAB Bootcamp); primary instructor *Spring 2026*
Math 53 (Multivariable Calculus) with Maciej Zworski *Fall 2025*
CompSci 271 (Randomness and Computation) with Alistair Sinclair *Fall 2024*
Math W54 (Linear Algebra and Differential Equations) with Arun Sharma *Summer 2024*
Math 55 (Discrete Mathematics) with Sylvie Corteel *Fall 2023*
Math W54 (Linear Algebra and Differential Equations) with David Nadler *Summer 2023*
Math 16B (Analytic Geometry and Calculus) with Alexander Paulin *Spring 2023*

Assistant Research Fellow *2020-2022*
Alfréd Rényi Institute of Mathematics

Advised by Miklós Abért. Partially funded by a Fulbright scholarship.

Teaching Assistant *2016-2019*
The Ohio State University

MATH 1130 (Algebra for Business) with James Sutherland *Fall 2019*
MATH 4182H (Honors Analysis 2) with Zbigniew Fiedorowicz *Spring 2019*
MATH 4181H (Honors Analysis 1) with Zbigniew Fiedorowicz *Fall 2018*
MATH 4182H (Honors Analysis 2) with Zbigniew Fiedorowicz *Spring 2018*
CSE 2321 (Discrete Mathematics) with Michael Fritz *Summer 2016*
CSE 2221 (Software Components) with Diego Zaccai *Spring 2016*

Mathematics Tutor *2016-2017*
The Ohio State University

In addition to working at the Math and Stats Learning Center as a public tutor for Calculus I, II, and III, I also worked as a private tutor for students in a variety of mathematics courses.

Community Engagement

University of California, Berkeley: Directed Reading Program *2024-Present*

Mentoring undergraduate students in learning an advanced topic, and helping to build mathematical maturity, critical thinking, and problem solving skills.
Subjects include high-dimensional probability, Brownian motion, and random matrix theory.

University of California, Berkeley: Probability Student Seminar *2024-Present*

Organizing the weekly seminar for probability students at UC Berkeley, including organizing food for meetings as well as extra community-building events.

Expository math videos on YouTube *2021-Present*

I host Spectral Collective, which is a YouTube channel hosting educational content aimed at graduate students and advanced undergraduates, mostly about topics in probability.
I've also made a guest video for 3Blue1Brown, and my videos have over 1 million views.
I write scripts, create animations, do voice-overs, edit videos, and engage with commenters.

Erdős Center: semester on large networks and their limits *2022*

Assistant organizer, mostly working on social activities, for the school on *Graphs, Groups, and Stochastic Processes*, as well as the school on *Mathematics of Large Networks*.

The Ohio State University: Radical Pi math club *2018-2020*

Lead organizer for the undergraduate math club at OSU, organizing talks from professors and ensuring plentiful free pizza.

Awards

UC Berkeley Outstanding Graduate Student Instructor Award *2026*
Winner of the 2nd Summer of Math Exposition (#SoME2) *2022*
National Science Foundation Graduate Research Fellowship *2022*
Fulbright Grant (Budapest Semesters in Mathematics–Rényi Institute) *2020*
Barry Goldwater Scholarship *2019*