

Dianchao (David) Wu

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EDUCATION

Iowa State University

Aug. 2023 - May 2027 (expected)

Bachelor of Science, Mathematics

- **Cumulative GPA:** 3.85/4.0; **Math GPA:** 3.89/4.0
- **Math Coursework:** Partial Differential Equations (PDEs), Mathematical Finance, Abstract Algebra, Linear Algebra, Elementary Differential Equations, Calculus, Discrete Mathematics
- **Research Interests:** Stochastic analysis and mathematical finance, especially SDEs/SPDEs, martingale methods, diffusion models, and pricing/hedging theory

HONORS AND AWARDS

Fred Wright Mathematics Endowed Scholarship

May 2026

- Awarded a \$1,200 scholarship by the Department of Mathematics to students demonstrating strong academic achievement, research promise, and leadership potential in mathematics.

ISU Athletics O.S.C.A.R.S. Award

May 2026

- Recognized for the highest individual GPA among Iowa State student-athletes.

RESEARCH EXPERIENCE

Student Researcher, Langevin Dynamics and Self-Diffusion Project

Summer 2026 - Present

Supervised by Prof. David P. Herzog, Department of Mathematics, Iowa State University

- Study self-diffusion for interacting particle systems governed by Langevin dynamics, with emphasis on stochastic differential equations, ergodicity, martingale decompositions, and Brownian-motion limits.
- Implement Python simulations of Metropolized Langevin dynamics and self-diffusion models, using mean squared displacement to estimate effective diffusion coefficients numerically.
- Read, reconstructed, and typed up central parts of the theoretical argument, including the Poisson equation, Ito's formula, martingale methods, correctors, and the diffusion tensor.
- Investigate finite-time convergence for the diffusion limit through Kolmogorov-distance formulations, corrector estimates, ergodic-average error, and martingale CLT error.
- Built on an earlier directed study in stochastic processes, Ito calculus, and stochastic differential equations.

ISmART Research Project: Random Matrix Theory and Quantum Expanders

Spring 2026 - Present

Supervised by Dr. Jananan Arulseelan, Iowa State University

- Participated in an official ISmART research project on random matrix theory, Haar-distributed unitary matrices, malnormal matrices, commutator lower bounds, and quantum expanders.
- Developed numerical simulations to investigate non-normal spectral behavior, pseudospectra, and finite-dimensional operator-theoretic conjectures.
- Produced a final technical note on Haar random unitaries, commutator bounds, and pseudospectral behavior.

RESEARCH-ORIENTED DIRECTED STUDIES

Partial Differential Equations and SPDE Preparation

Summer 2026 - Present

Supervised by Prof. Rana Parshad

- Study graduate-level PDE and analysis as preparation for a potential SPDE research project related to MBS.
- Work through Sobolev spaces, weak derivatives, weak and distributional solutions, energy methods, elliptic and parabolic equations, and functional-analytic methods for PDE.
- Prepare expository notes on fundamental solutions, the Dirac delta, Poisson equations, wave equations, and weak/distributional formulations.

Measure Theory and Functional Analysis Foundations

Summer 2026 - Present

Supervised by Prof. Ruoyu Wu

- Study graduate-level measure theory, including outer measures, Borel sets, measurable functions, convergence theorems, Lebesgue integration, product measures, and L_p spaces.
- Connect measure-theoretic foundations with probability theory, stochastic processes, PDE/SPDE analysis, and weak convergence.

Stochastic Processes and Stochastic Analysis

Spring 2026

Supervised by Prof. David P. Herzog

- Studied Markov processes, martingales, Brownian motion, Ito calculus, stochastic differential equations, infinitesimal generators, and diffusion processes.
- Prepared technical notes on stochastic dynamics, Ito diffusion generators, and foundational tools later used in the Langevin self-diffusion project.

EXTRACURRICULAR

ISU Men's Golf Team

August 2023 - Present

- Represent Iowa State University in NCAA Division I tournaments.
- Balance 20+ hours of weekly training and competition with a full mathematics course load, contributing to team strategy and morale.
- Best World Amateur Golf Ranking (WAGR): 443rd.

ADDITIONAL

- **Technical Skills:** Python, MATLAB, LaTeX; numerical simulation
- **Languages:** English (fluent), Mandarin and Hakka (native)
- **Other Interests:** Philosophy, psychology, finance