

Zihan Xu

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Research Interests

Stochastic dynamical systems, scientific machine learning, uncertainty quantification, computational biology, and quantitative oncology.

Education

University of California, Merced Aug. 2021–Expected Spring 2027
Ph.D. in Applied Mathematics; Advisor: Prof. Changho Kim GPA: 4.00/4.00

- **Selected coursework:** Scientific Computing (MATH 233) and Deep Learning (EECS 230).

University of Southern California Aug. 2017–May 2019
M.S. in Mathematical Finance GPA: 3.87/4.00

Iowa State University Aug. 2010–Dec. 2014
B.S. in Applied Mathematics: Actuarial Science GPA: 3.73/4.00

Bioinformatics and Cancer Biology Training

UC San Diego Extended Studies 2026–Present
Specialized Certificate in Applied Bioinformatics Expected 2026

- **Completed coursework:** Bioinformatics Fundamentals (BIOL-40236), A+; Genomic Sequencing Technologies (BIOL-40237), A.
- **Scheduled coursework, Sept. 28–Nov. 27, 2026:** Processing Actionable Data in Genomics (BIOL-40327); Modern-Omics: Technologies and Applications (BIOL-40374).

Harvard Medical School, HMX July–Oct. 2026
Cancer Genomics and Precision Oncology: The Genetic Basis of Cancer and Its Treatment In Progress

Research Experience

Graduate Student Researcher Fall 2022–Present
University of California, Merced Merced, CA

- Developed Statistics-Informed Neural Network (SINN) surrogate models in Python and PyTorch to generate stochastic time trajectories from ensemble statistics without requiring trajectory-wise correspondence.
- Designed conditional-statistics loss functions using the mean, standard deviation, skewness, and kurtosis to preserve non-Gaussian behavior across parameter regimes.
- Extended SINN to multidimensional stochastic processes using marginal and cross-variable statistics and to slowly varying stochastic systems using a branch-trunk recurrent architecture for parameter-conditioned trajectory generation.
- Conducted scientific-computing experiments and model evaluation using numerical methods and high-performance computing resources.
- Contributed to the DOE project “Machine-Learning-Based Surrogate Modeling for Stochastic Multiscale Simulation Methodology” (DE-SC0024240) and the NSF project “LEAPS-MPS: Stochastic Particle-Continuum Hybrid Simulation Method for Model Heterogeneous Catalysts under Reaction Conditions” (CHE-2213368).

Research Intern Summer 2025
Applied Mathematics and Computational Research Division, Lawrence Berkeley National Laboratory Berkeley, CA

- Embedded SINN as a neural surrogate for the fast stochastic component of a two-way coupled particle-continuum hybrid simulation.
- Integrated SINN-generated stochastic trajectories into the multiscale workflow for computationally efficient hybrid simulation.

Publications and Manuscripts

Learning and Generating Time Trajectories of Multidimensional Stochastic Processes

Zihan Xu, Changho Kim, Yuanran Zhu, Bhargav Siddani, and Andy J. Nonaka

Manuscript in advanced preparation; submission expected late September or early October 2026.

Selected Computational Projects

Statistics-Informed Neural Network Code and Numerical Experiments

Python, PyTorch, NumPy, SciPy, and pandas

- Implemented recurrent neural-network surrogates for stochastic trajectory generation, multidimensional stochastic processes, and slowly varying parameter regimes.
- Built conditional-statistics loss functions and numerical evaluation workflows for comparing SINN architectures.
- **Code portfolio:** github.com/Zihan-Xu527.

High-Performance Computing Research Workflows

UC Merced Pinnacles HPC cluster

Slurm; Linux

- Ran model-training and numerical-experiment workflows using Slurm, MPI, and Linux shell scripting.

Presentations

SIAM Conference on Computational Science and Engineering (CSE27)

Feb. 22–26, 2027

Invited Talk; Pittsburgh, PA

- *Learning Time Trajectories of a Stochastic Dynamical System with a Slowly Varying Parameter*

SIAM Conference on Mathematics of Data Science (MDS26)

Nov. 16–20, 2026

Accepted Poster Presentation; Salt Lake City, UT

- *Learning Time Trajectories of a Stochastic Dynamical System with a Slowly Varying Parameter*

Northern and Central California Section of SIAM Annual Meeting (NCC26)

Oct. 2026

Planned Poster Presentation; University of California, Davis

Davis, CA

- **Project:** Comparison of SINN architectures.

2nd SIAM Northern and Central California Sectional Conference (NCC25)

Oct. 2025

Poster Presentation; Lawrence Berkeley National Laboratory, Berkeley, CA

- *Learning Kinetic Monte Carlo Using Statistics-Informed Neural Network*

SIAM Conference on Computational Science and Engineering (CSE25)

Mar. 2025

Oral Presentation; Fort Worth, TX

- Invited minisymposium: “Machine Learning with Applications in Chemical and Materials Sciences.”
- *Learning Kinetic Monte Carlo Using Statistics-Informed Neural Network*

SIAM Conference on Mathematics of Data Science (MDS24)

Oct. 2024

Poster Presentation; Atlanta, GA

- *Extending Statistics-Informed Neural Network to Multidimensional Stochastic Processes*

Northern and Central California Section of SIAM Annual Meeting (NCC24)

Oct. 2024

Poster Presentation; Merced, CA

- *Extending Statistics-Informed Neural Network to Multidimensional Stochastic Processes*

SIAM Annual Meeting (AN24)

July 2024

Poster Presentation; Spokane, WA

- *Extending Statistics-Informed Neural Network to Multidimensional Stochastic Processes*

Technical Skills

- **Programming and scientific computing:** Python, PyTorch, NumPy, SciPy, pandas, scikit-learn, Matplotlib, Seaborn, C++, MATLAB, and Mathematica.
- **High-performance computing and development:** Slurm, MPI, Linux shell scripting, Git, Docker, Jupyter, VS Code, PyCharm, L^AT_EX, and the UC Merced Pinnacles cluster.
- **Data analysis:** R and SQL.
- **Bioinformatics and genomics training:** Bioinformatics Fundamentals (A+) and Genomic Sequencing Technologies (A) completed; Processing Actionable Data in Genomics and Modern-Omics scheduled for Sept. 28–Nov. 27, 2026.

Fellowships and Awards

Student Travel Award <i>Society for Industrial and Applied Mathematics (SIAM)</i>	2026 <i>Registration and travel support for MDS26</i>
Travel Award <i>University of California, Merced Graduate Division</i>	Summer 2025–26 <i>\$9,000</i>
NCC25 Travel Award <i>2nd SIAM Northern and Central California Sectional Conference</i>	2025 <i>Travel reimbursement up to \$500</i>
AMAT Travel Award <i>University of California, Merced Graduate Division</i>	Spring 2025 <i>\$1,500</i>
Broader Engagement Program Fellowship <i>SIAM Conference on Mathematics of Data Science</i> Selected for the Broader Engagement Program, including conference participation, mentorship, technical programming, and a poster presentation at MDS24.	Oct. 2024 <i>Full conference travel support</i>
Best Poster Presentation Award <i>UC Merced Applied Mathematics Research Retreat</i>	Aug. 2024
Graduate Division Travel Fellowship <i>University of California, Merced</i>	Summer 2024 <i>\$1,500</i>
Applied Mathematics Summer Research Fellowship <i>University of California, Merced</i>	Summer 2023 <i>\$8,250</i>

Teaching Experience

Teaching Assistant <i>University of California, Merced</i> - Calculus II (MATH 012), Fall 2026. - Probability and Statistics (MATH 32), Fall 2025. - Linear Analysis I (MATH 141), Spring 2023. - Calculus I (MATH 21), Fall 2022. - Linear Algebra and Differential Equations (MATH 24), Fall 2021, Spring 2022, and Summer 2022.	Aug. 2021–May 2023; Fall 2025; Fall 2026 <i>Merced, CA</i>
Grader, Investment Analysis and Portfolio Management (FBE 555) <i>University of Southern California, Marshall School of Business</i>	Fall 2018 <i>Los Angeles, CA</i>
Grader, Elementary Differential Equations (MATH 267) <i>Iowa State University</i>	Fall 2013 <i>Ames, IA</i>

Pedagogy Training

Principles of Pedagogy and Advanced Pedagogy Workshops <i>University of California, Merced</i>	Fall 2023–Spring 2024 <i>Merced, CA</i>
Introduction to Scientific Teaching (MATH 201) <i>University of California, Merced</i>	Fall 2021 <i>Merced, CA</i>

Additional Professional Experience

Math and Science Teacher <i>GoElite Inc.</i>	June 2020–June 2021 <i>Los Angeles, CA</i>
Customer Database Management Intern <i>EXC Trading LLC</i>	Sept. 2019–May 2020 <i>Chicago, IL</i>
Data Analyst <i>Ames IT and Numeric Solutions, LLC</i>	Apr. 2015–June 2017 <i>Ames, IA</i>
Actuarial Summer Intern <i>Ping An Insurance Company</i>	May–July 2013 <i>Shenyang, China</i>

Actuarial Examinations

Society of Actuaries Exams MFE (2016), MLC (2013), P (2013), and FM (2012); Validation by Educational Experience in Applied Statistical Methods, Corporate Finance, and Economics.