

Jiaxin (Margot) Yuan

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Efficient Ph.D. candidate with 4+ years in stochastic process modeling, programming, and data mining. Extensive experience with using statistical and mathematical methods to solve molecule dynamical system problems by combining machine learning and traditional models.

EDUCATION

Ph.D. in Applied Mathematics, University of Maryland | College Park, MD | May 2025 | GPA: 3.86/4.00

- Area of interest: Stochastic differential equation, Molecular dynamics, Machine learning, Optimal control
- Advisor: Maria Cameron

B.S. in Mathematics, The Pennsylvania State University, State College, PA | May 2020

- Minor in **Economics** | **Schreyer Honors College** | Honor Roll and best student award every year | **GPA: 4.0/4.0**
- Dean's list; The President's Freshman Award; The President Sparks Award

EXPERIENCE

Optimal controller and estimation of transition rate in Transition Path Theory | University of Maryland

College Park, MD | May 2022 – Current

- Derived an optimal controller that is applicable to both overdamped Langevin dynamics and full Langevin dynamics
- Developed an innovative method for estimating the transition rate of rare events with high precision, by using information from optimal controlled processes under the framework of Transition Path Theory
- Obtained transition rates for rare transitions effectively and robustly with simulation of controlled process using committors from reduced model or rough approximation, outperforming ones from Transition Path Theory formula
- Quantified committor function via fully-connected Neural network and Physics-informed neural network in Python
- Investigated the impact of the training set on performance of neural network result
- Improved the accuracy of estimating transition rate by at most 200% in high-dimensional systems

Representation learning in causal inference framework | University of Maryland

College Park, MD | September 2022 – Current

- Learned causally disentangled representation using causal diagram, and proved bounded interventional robustness with proposed method
- Provided a unified framework that solves the conflict between human annotated-labels and causally disentangled representation

Computing Committor function using the tensor train format | University of Maryland

College Park, MD | October 2021— April 2022

- Solved high dimensional committor function using tensor train format in Python
- Adapted the method to example with Mueller's potential in 2D, whose results outperformed the ones solved by neural network

Pricing and hedging variable annuity via Monte Carlo simulation | The Pennsylvania State University

State College, PA | August 2018 – May 2020

- Created a pricing estimation model for Variable Annuity via Monte Carlo simulation in C++ for different assumptions
- Constructed various methods of hedging strategies and made comparisons under different scenarios

Matrix Lie Groups | The Pennsylvania State University

State College, PA | June 2019 - August 2019

- Accomplished REU project report and presented at the poster symposium with literature reviews in the fundamentals of matrix Lie groups and application in integrability of Lie systems

SKILLS

Programming: Proficient in Python (Pandas, PyTorch, NumPy, Scikit-learn, Matplotlib), MATLAB, R, C++ , LaTeX

Languages: English, Mandarin, Cantonese

LEADERSHIP

Secretary | Women in Math

College Park, MD | October 2021— April 2022

- Provided support for the organization running via recording minutes and advertising events through emails and social media

Teaching Assistant | University of Maryland

College Park, MD | October 2021— Current

- Guided discussion sessions in pre-calculus, calculus I, II, and fundamental statistic courses and taught pre-calculus as sole instructor
- Helped supervising REU program in summer 2022 as a teaching assistant

Sisterhood Development chair | Kappa Beta Gamma Phi Chapter

Harrisburg, PA | April 2017 - December 2017

- Led and organized a trip to Eastern State Penitentiary and raised funding from educational institutions
- Organized weekly and monthly bonding events for new members and other active members