Zachary James McNulty

Contact Information

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Education

University of California, Berkeley

Ph.D. Candidate in Applied Mathematics
- Advisor: Steve Evans
- Interests: Random trees, optimal mixing, and high-dimensional probability

University of Washington, Seattle

B.S. Applied Mathematics (summa cum laude), January 2020
- Concentration in Discrete Math and Algorithms

A full course list is available on my website

Programming Languages

Proficient: Python, Bash/Unix, LaTeX, git
Familiar: C/C++, SQL, Java, MATLAB,
GitHub: zackmcnulty

Experience

Evans Research Group
Graduate Student Researcher — 2022+
- Characterizing Doob-Martin compactification of the uniform d-ary tree Markov process produced by Marckert's algorithm.
- Developing a scaling limit for the NNI tree-exchange process as a Markov chain on the space of $\mathbb{R}$-trees

UW Shea-Brown Lab
Undergraduate Training Program in Computational Neuroscience — 2018-2020
- Studied how RNNs extract low-dimensional representations of latent variables underlying predictive learning tasks
- Implemented neural networks and a variety of dimensionality reduction techniques in Tensorflow/Keras

Center for Reproducible Biomedical Modeling
Summer Undergraduate Internship — Summer 2018
- Improved/documented Systems Biology software (Tellurium)
- Developed software for potential DREAM Challenge related to inferring casuality in randomized gene regulatory networks

UW Research Computing Club
Summer Undergraduate Leader — 2018-2020
- Shared my experience with slurm schedulers, utilizing GPUs, and interacting with remote servers for HPC
- Received training in parallel-computing, pyMPI, and OpenMP

Scholarships, Grants, and Awards

UC Berkeley Mathematics Summer Grant	2022,2023
University of Washington Honors Undergraduate Scholar	2016-2018
NIKE Frank Rudy Scholarship	2016-2020
National Scholar Foundation Peer Tutor	2016-2018

Presentations

Total Variation Bounds in Poisson Approximation Using Size-Biased Coupling, Student Probability Seminar, UC Berkeley (Spring 2023)

A Spatial Markov Property for the Continuum Gaussian Free Field, Student Probability Seminar, UC Berkeley (Spring 2022)

Applications of Spectral Bounds on Markov Chain Mixing Times to Projected and Product Chains, Student Probability Seminar, UC Berkeley (Fall 2021)

Inferring Low-Dimensional Latent Structures with Recurrent Neural Networks, Department of Mathematics, University of Washington. (June 2019)

Certifications and Workshops

Random Matrix Theory, OSU Summer School 2023

Concentration in High-Dimensional Probability and Geometry, MSRI Summer School 2023

TCS Summer School on Optimal Markov Chain Mixing, UCSB

Undergraduate Training Program in Computational Neuroscience, University of Washington Computational Neuroscience Center

Teaching and Organizational

Probability Student Seminar Organizer
UC Berkeley Department of Mathematics
- Superconcentration of Measure (Fall 2023)

Directed Reading Program
UC Berkeley Department of Mathematics
- Time Series Analysis by State Space Methods (Fall 2023)

Graduate Student Instructor
UC Berkeley Department of Mathematics
- Integral Calculus (Fall 2020 - Fall 2021)
- Linear Algebra and Differential Equations (Spring/Summer 2022)
- Multivariable Calculus (Fall 2022)
- Discrete Math (Spring 2023)
- Certificate in Teaching and Higher Learning (in-progress)

References

Prof. Steve Evans, UC Berkeley (`evans@stat.berkeley.edu`)
Prof. Eric Shea-Brown, University of Washington (`etsb@amath.washington.edu`)
Prof. Nathan Kutz, University of Washington (`kutz@uw.edu`)

Volunteering And Outreach

Seattle Animal Shelter and Rabbit Ears Rescue
- Helped feed, clean, and socialize animals to prepare them for adoptions as well as help traumatized animals return to normalcy
- Volunteered at adoption events to help find animals suitable future homes and educate the local community on proper animal care

Tent City Collective
- Worked with local communities and legislators to advocate housing reform
- Volunteered for Tent City 3 and helped organize their stay at UW, the first public university in the nation to agree to do so

Camp Kesem

- Helped run Camp Kesem, a summer camp for children whose parents are fighting cancer, helping them to process their emotions in a supportive environment.

Engineering Outreach

- Helped run UW's annual Engineering Discovery Days outreach event
- Ran events at local high schools to help foster curiosity and passion in STEM