

Minh Nguyen

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RESEARCH INTERESTS

Optimal Transport, Partial Differential Equations, Machine Learning and Data Science

EDUCATION

California Institute of Technology, Pasadena, California 09-2025 — Present
Doctor of Philosophy in Applied and Computational Mathematics, Advised by Professor Franca Hoffmann

Michigan State University, Honors College, East Lansing, Michigan 09-2021 — 05-2025
Bachelor of Arts in Advanced Mathematics, Minor in Computer Science Major GPA: 3.93/4.0

RESEARCH EXPERIENCE

Caltech Computing + Mathematical Sciences Pasadena, California
Advisors: Professor Franca Hoffmann 6-2024 — Present

- Mathematically proved qualitative estimates for obtaining Knothe maps via a free-target version of optimal transport
- Introduced a non-parametric estimator for estimating triangular vector fields used for conditional sampling tasks
- Implemented particle based methods and diffusion based methods for conditional sampling
- Work presented by Franca Hoffmann at "Optimal Transport and Applications" Conference in Pisa and the Fields Institute in Toronto

MSU Mathematics Department East Lansing, Michigan
Advisor: Professor Jun Kitagawa 1-2024 — Present

- Research assistant through NSF DMS-2246606 researching gradient flows and anisotropic diffusion equations with applications to sampling and stochastic processes

Advisor: Professor Son Tu 1-2024 — Present

- Studied Hamilton-Jacobi equations with state constraints
- Authored an expository report on Hamilton-Jacobi equations and state-constraint solutions to Hamilton-Jacobi equations

MSU Signals, Learning and Imaging Group East Lansing, Michigan
Advisor: Professor Sai Ravishankar 09-2022 — 03-2024

- Developed end-to-end deep learning based MRI reconstruction algorithms that are provably robust to adversarial attacks
- Co-first author publication accepted for publication at Journal on Selected Topics in Signal Processing

PUBLICATIONS (= denotes alphabetical ordering)

= [2] R. Baptista, F. Hoffmann, **M.V. Nguyen**, B. Zhang, "Knothe-Rosenblatt maps via soft-constraint optimal transport", *in progress*

[1] S. Liang*, **M.V. Nguyen***, J. Jia, I. Alkhouri, S. Liu, S. Ravishankar, "Robust MRI Reconstruction by Smoothed Unrolling (SMUG)", *Accepted to Journal of Selected Topics in Signal Processing* (2025)

TALKS

7. *Knothe-Rosenblatt maps via soft-constrained optimal transport*, UT Austin DSML, 10-2024 (*online*)
6. *From Benamou-Brenier optimal transport to triangular velocity fields*, Caltech Student-Faculty Programs Summer Seminar, 08-2024
5. *Rate of convergence of vanishing viscosity procedure for static problems, via a doubling variable method*, 21th MSU Student Mathematics Conference, 04-2024 (**Best Presentation Award**)
4. *Gaussian Smoothed Optimal Transport*, UT Austin Data Science and Machine Learning (DSML) Lab's Optimal Transport reading group, 03-2024 (*online*)
3. *Rate of convergence of Smoothed Unrolling for MRI reconstruction*, 3rd MSU Data Science Conference 09-2023 (**Best Poster Award**)

2. *Rate of convergence of Smoothed Unrolling for MRI reconstruction*, Signals, Learning and Imaging Group Meeting, 09-2023
1. *Randomized smoothing for robustness training*, Signals, Learning and Imaging Group Meeting, 01-2023

SELECTED MATH COURSES

- PhD Quals Measure Theory
 - PhD Quals Econometrics
 - PhD Quals Partial Differential Equations
 - PhD Quals Differential Geometry
 - PhD Quals Functional Analysis
 - Honors Real Analysis 1 & 2
 - Honors Abstract Algebra 1 & 2
 - Point Set Topology
- Real Analysis, Folland
Statistical Inference, Casella and Berger
Partial Differential Equations, Evans
Introduction to Smooth Manifolds, Lee
A Course in Functional Analysis, Conway
Course notes: Net based approached to analysis
Group theory: Algebra, Artin. *Galois theory*: Topics in Algebra, Herstein
Munkres, Topology

AWARDS

- **Larry Fowler Research Award** 05-2024
Awarded \$4000 to work on Hamilton Jacobi theory with Dr. Son Tu, via MSU's College of Natural Science
- **21st Annual MSU Student Math Conference** 04-2024
Best Presentation Award
- **ULA Award for Excellence in Teaching** 04-2024
For excellence in teaching as an undergraduate learning assistant in Mathematics
- **Best Conference Poster** 10-2023
MSU's 3rd Data Science Conference
- **RE Phillips Award** 05-2023
Awarded \$1250 merit award in the Department of Mathematics, MSU
- **SpartaHack 8, Winner** 01-2023
Winner of Best AI Project in MSU's premier hackathon (400+ attendants)
- **Wielenga Research Scholar** 08-2023
Awarded \$4000 through MSU's Honors College to work as a Professorial Assistant with Prof. Sai Ravishankar
- **MSU Provost Undergraduate Research Initiative** 05-2022
Awarded \$2000 for research in applied economics
- **Econ Scholar, Michigan State University** 05-2022
Top 3% of Economics Undergraduates

TEACHING EXPERIENCE

- **Undergraduate Learning Assistant/Learning Center Tutor**: Honors Calculus 3, Honors Linear Algebra, Calculus 2, Macroeconomics
- **Recitation Leader**: Honors Calculus 3, Calculus 2

SERVICE

- Student Representative, Undergraduate Studies Committee: Department of Mathematics, 2024-25 Academic Year
- Math Learning Center Supervisor, MSU
- Organizer: MSU 2nd Data Science Conference, Oct. 2022