Xiaonan (Nikki) Xu

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Education

North Carolina State University — Raleigh, NC
Ph.D. in Mathematics — *Aug 2020 – Jul 2025 (expcted)*
- Dissertation: Reinforcement Learning and Optimal Control — *Advised by Dr. Hien Tran*
- GPA: 3.6

Lamar University — Beaumont, TX
MS in Mathematics — *Jan 2019 – May 2020*
- Thesis: p-adic Thickness of Generalized Cantor Sets — *Advised by Dr. Robert Vallin*
- GPA: 4.0

Drexel University — Philadelphia, PA
BS/MS in Chemical Engineering — *Sep 2009 – Jun 2014*

Experience

Industrial

- Hydrogen Network Optimization Consultant at Process Integration Ltd. — *Oct 2014 – Apr 2016*
  - Optimized petroleum refining processes using GAMS, emphasizing on plant-wide hydrogen consumption and liquefied petroleum gas recovery.
  - Designed dynamic process simulations for sour gas sweetening units using HYSYS and KG-Tower.
  - Developed knowledge transfer reports contributing to superstructure optimization for refineries.
- Process Engineer Co-op at Solvay Specialty Polymers — *Sep 2012 – Mar 2013*
- Quality Control and Research Chemist Co-op at Gelest Inc. — *Nov 2011 – Feb 2012*
- Environmental Engineer Co-op at Philadelphia Water Department — *Oct 2010 – Mar 2011*

Teaching

- Lab Assistant at Center for Research in Scientific Computation — *Aug 2023 – present*
- Graduate Resource TA for First Year Grad Seminar — *Aug 2022 – Dec 2022*
  - Developed materials to support first-year PhD students through the transition into graduate school.
  - Assisted in providing sufficient training and troubleshooting for first year students' teaching responsibilities.
  - Addressed the mental and emotional well-being of first year PhD students by developing workshops and inviting professional speakers.
- Instructor of Record for Calculus II/III — *Aug 2020 – Aug 2022*

Publications

Xu. X. with Tran, H.T., *"Robustness of Reinforcement Learning Based Control"* (in preperation)

Xu. X. with Alm, J.F. et al, *"Improved bounds on the size of the smallest representation of relation algebra* 32_{65}*"*, Algebra Universalis, 2022, 83:32 (https://doi.org/10.1007/s00012-022-00791-4)

Xu, X. with Mahavier, W.T., *"ODE and Analysis"*, Inquiry-Based Learning Textbook (in preparation)

Presentations

Xu, X., *"Modeling in Reinforcement Learning for Robust Control"*, oral presentation, Applied Math Graduate Student Seminar, Raleigh, NC

Xu, X. with Xu, Q., *"Iterative Fault Isolation for Integrated Chemical Systems based on Approximate Linear Model Inversion"*, poster presentation, 2018 AIChE Annual Meeting, Pittsburgh, PA

Xu, X. with Zhang, J. et al, *"Comparison of Ozone Analyses between CAMx and DENFIS for Selected Monitoring Sites in an Ozone Nonattainment Area"*, oral presentation, 2017 AIChE Annual Meeting, Minneapolis, MN

Workshops

Promoting Research Improvement through Mentorship Education (PRIME) - PRIME the Pack *Jun – Jul, 2024*

International Symposium on Symbolic and Algebraic Computation (ISSAC) *Jul, 2024*

Workshop on Differential Algebra and Modeling *Jul, 2024*

SIAM Graduate Student Mathematical Modeling Camp (GSMMC) *Jun, 2024*

- Contributed to developing an ADMM approach for solving a graph Laplacian regularization for image deblurring problem implemented in Python.

SIAM Mathematical Problems in Industry (MPI) *Jun, 2024*

- Contributed to reduction of noise and ringing for image processing with Raytheon Group using bilateral Laplace transform implemented in Matlab.

Summer School and Workshop on Computational and Data Science *Aug, 2023*

Projects

Reconstructing a Dual Certificate of Non-negative Polynomials

- Transformed the non-negativity of polynomials into an optimization problem over non-symmetric cones.
- Applied interior point method to the dual cone to construct the certificate.

Topological Data Analysis and Optimal Transport

- Applied optimal transport theory to analyze the expected behavior of a collection of persistence diagrams

Services

NCSU

- Member of Departmental Student Success Committees *Aug 2023 – present*
  - Collaborated between students and faculty to enhance initiatives aimed at providing math PhD students a living stipend.
  - Facilitated data gathering about TA training and workload in the math department.
  - Coordinated surveys about teaching requirement for qualifying exam courses and best practice for research and academic advising in the math department.
- President of SIAM Student Chapter *Jul 2022 – Jul 2023*
  - Conducted and coordinated several workshops for introduction to Matlab, Python, and LaTeX.
  - Organized info sessions and visits from national labs.

Other Activities

- President of Technical Innovation and Entrepreneurship Club at Lamar University
- Member of Drexel University Smart House Club: interior and water recycling system design
- Contestant of Drexel University Design Charrette: urban design

Skills

Languages: Python, R, Julia, Matlab, Mathematica
Simulation Tools: ASPEN, HYSYS Dynamics, ProII, CAMx