Xuanming Zhang

Industrial and Systems Engineering
University of Minnesota Twin Cities
Minneapolis, MN

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Education

University of Minnesota, Minneapolis, MN 2021–present
Ph.D. in Industrial and Systems Engineering
Advisor: Prof. Kevin Leder

Fudan University, Shanghai, China 2017–2021
B.Sc. in Applied Mathematics
Outstanding graduate of Fudan University

Academic Appointments

University of Minnesota, Minneapolis, MN

- Research Assistant, Department of Industrial and Systems Engineering 2021–present
  Advisor: Prof. Kevin Leder
  Research topic: Quantitative and mathematical modeling of tumor dynamics with applications to therapy design and optimization.

CUHK-Shenzhen, Shenzhen, China

- Summer Research Assitant, School of Data Science Summer 2024
  Advisor: Prof. Zicheng Wang
  Project: Parameter Estimation in Recurrent Tumor Evolution with Limited Carrying Capacity.
- Summer Research Assitant, School of Data Science Summer 2020
  Advisor: Prof. Pengyi Shi, Prof. Xinyun Chen
  Project: A high-fidelity, machine-learning enhanced queueing network simulation model for hospital ultrasound operations.

Shanghai University of Finance and Economics, Shanghai, China

- Undergraduate Research Assistant, Research Institute for Interdisciplinary Sciences 2020–2021
  Advisor: Prof. Bo Jiang
  Research topic: Revenue Management under a price alert mechanism

Teaching Experiences

University of Minnesota

Teaching Assistant, IE 4551/5551: *Production, Inventory, and Service Operations* Spring 2025
Teaching Assistant, IE 3521: *Statistics, Quality, and Reliability* Spring 2023
Teaching Assistant, IE 3521: *Statistics, Quality, and Reliability* Spring 2022
Teaching Assistant, IE 4551/5551: *Production and Inventory Control* Spring 2022
Teaching Assistant, IE 3553/5553: *Simulation* Fall 2021

Shanghai University of Finance and Economics

Teaching Assistant, *Markov Chain and Stochastic Processes* Summer 2019

Research Interests

My research focuses on the mathematical modeling of **tumor evolution** and **therapeutic response** through frameworks such as **branching processes**, **ordinary differential equations** (ODEs), and **stochastic differential equations** (SDEs). I employ **probabilistic** and **statistical** methods to theoretically analyze these models, uncovering **intratumoral heterogeneity**, evaluating its therapeutic implications, and estimating key parameters of tumor dynamics.

Publications (*Authors in Alphabetical Order)

***Leder, K., Wang, Z., and Zhang, X.** (2025). Parameter Estimation in Recurrent Tumor Evolution with Limited Carrying Capacity. *Preprint.*

***Gunnarsson, E.B., Leder, K., and Zhang, X.** (2025). Limit theorems for the site frequency spectrum of neutral mutations in an exponentially growing population. *Stochastic Processes and Their Applications.*

***Leder, K., Sun, R., Wang, Z., and Zhang, X.** (2024). Parameter estimation from single patient, single time-point sequencing data of recurrent tumors. *Journal of Mathematical Biology*, 89(5), 51. [Link]

Pan, Y., Xu, Z., Guang, J., Chen, X., Dai, J.G., Wang, C., Zhang, X., et al. (2021). A high-fidelity, machine-learning enhanced queueing network simulation model for hospital ultrasound operations. In *Winter Simulation Conference (WSC)*. IEEE.

Research In Progress

Mathematical Modeling of MDSC-Mediated Immunosuppression in Glioblastoma under Radiotherapy

Developing an ODE-based model of the glioblastoma tumor–immune microenvironment to study the role of myeloid-derived suppressor cells (MDSCs) under radiotherapy. The model, calibrated to clinical data, explores optimal RT dosing strategies and generates in silico virtual clinical trials.
Collaborators: Kevin Leder, Jasmine Foo, Lindsey Sloan, John Metzcar.

Mathematical Modeling of CISH-Knockout T Cells and Immune-Checkpoint Inhibition in Cancer Therapy

Constructing a population dynamical model incorporating endogenous and infused CISH-knockout T cells, IL-2 dynamics, and tumor burden. The model evaluates competition over IL-2 and synergy with checkpoint blockade, predicting conditions for durable tumor eradication.
Collaborators: Kevin Leder, Jasmine Foo, Emil Lou, Kamran Kaveh, Sarah Anderson.

Conference Presentations & Posters

Parameter Estimation in Recurrent Tumor Evolution with Limited Carrying Capacity

- *Contributed*, The 2025 INFORMS Applied Probability Society (APS) Conference, June 30 – July 3, 2025, Atlanta, Georgia, USA.
- *Poster*, Annual Meeting of the Society for Mathematical Biology (SMB), July 13-18, 2025, Edmonton, Alberta, Canada.

Limit theorems for the site frequency spectrum of neutral mutations in an exponentially growing population
◦ *Invited*, Special Session on Applications of Probability in Biology, AMS Fall Central Sectional Meeting, September 14–15, 2024, University of Texas, San Antonio, USA.

Parameter Estimation from Single Patient, Single Time-Point Sequencing Data of Recurrent Tumors
◦ *Invited*, Annual Meeting of the Society for Mathematical Biology (SMB), June 30 – July 5, 2024, Konkuk University, Seoul, Republic of Korea.
◦ *Invited*, The First Conference on Intelligent Computing and Decision-Making, July 7–9, 2024, Shanghai Jiao Tong University, Shanghai, China.
◦ *Contributed*, INFORMS Annual Meeting, October 15–18, 2023, Phoenix, Arizona, USA.

Honors and Awards

Travel Grant for INFORMS APS (2025)
Outstanding Graduate Award, Fudan University (2021)
National Scholarship, Ministry of Education, Fudan University (2018)

Professional Memberships

Member, INFORMS Applied Probability Society
Student Member, Society for Mathematical Biology

Skills

Programming/Software: MATLAB, Python, Julia
Languages: English (fluent), Chinese (native)

References

Kevin Leder (PhD Advisor)
Professor
Department of Industrial & Systems Engineering
University of Minnesota
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Jasmine Foo (PhD Committee Member)
Distinguished McKnight University Professor
School of Mathematics
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William L. Cooper (PhD Committee Member)
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Zicheng Wang (Collaborator)
Assistant Professor
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