Kaixin Zheng

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EDUCATION

University of Waterloo *Waterloo, ON, Canada*

Doctor of Philosophy in Computer Science Sept. 2025–present

- Supervisor: Dr. Anita Layton.
- GPA: 92.5/100 (equivalent to 4.0/4.0).

Master of Mathematics in Applied Mathematics (Thesis-based) Jan. 2023–Jan. 2025

- Supervisor: Dr. Anita Layton.
- GPA: 92.5/100 (equivalent to 4.0/4.0).
- Thesis: "Mathematical Models of Kidney Function: Effects of Hypertension and Circadian Rhythm."

New York University *New York, NY, United States*

Bachelor of Science in Honors Mathematics; Minor in Computer Science Sept. 2019–May 2022

- GPA: 3.89/4.0 (**summa cum laude**, top 5% across all majors).
- Transferred from University of California, Irvine after one year of physics coursework (GPA: 4.0/4.0).

RESEARCH INTERESTS

Scientific machine learning, operator learning, hybrid mechanistic/ML modeling, inverse problems for dynamical systems, generative models for biology

PUBLICATIONS

Preprint

- Zheng, K., & Layton, A. T. (2026). Why Directly Learning Periodic Trajectories Can Fail. arXiv.2609.32254

Peer-reviewed

- Zheng, K., & Layton, A. T. (2026). Circadian rhythms in glomerular filtration govern natriuresis and diuretic responsiveness. *Frontiers in Physiology*, 17, 1828410. https://doi.org/10.3389/fphys.2026.1828410
- Zheng, K., & Layton, A. T. (2024). Predicting sex differences in the effects of diuretics in renal epithelial transport during angiotensin II-induced hypertension. *American Journal of Physiology–Renal Physiology*, 326(5), F737–F750. https://doi.org/10.1152/ajprenal.00398.2023

PRESENTATIONS

UChicago and Caltech AI+Science Conference *Oct. 2026*

Poster: "Why Directly Learning Periodic Trajectories Can Fail." Chicago, IL, United States. (Upcoming)

RESEARCH EXPERIENCE

University of Waterloo

Supervisor: Dr. Anita Layton Waterloo, ON, Canada

- **PhD Researcher**, Cheriton School of Computer Science (Sept. 2025–present).
  - Characterizing failure modes of neural operators on oscillatory dynamical systems and designing architectures that address them.
  - Exploring generative models for parameter estimation in biological systems.
- **MMath Researcher**, Department of Applied Mathematics (Jan. 2023–Jan. 2025).
  - Built computational models of kidney function and renal circadian rhythms to study how sex and dosing time affect drug response in hypertension.

New York University *June 2021–Dec. 2021*

Advisor: Dr. David McLaughlin New York, NY, United States

- **Undergraduate Research Assistant**, Courant Institute of Mathematical Sciences.
  - Modeled calcium distribution in dendritic spines using PDE models.

HONORS AND AWARDS

Women in Mathematics Mentorship Award, University of Waterloo *Apr. 2025*

Graduate Research Studentship, University of Waterloo *Sept. 2025–June 2029*

- Departmental research funding covering tuition and stipend for PhD studies.

International Doctoral Student Award, University of Waterloo *Sept. 2025–June 2029*

- Multi-year award (CAD 15,420/year) for international PhD students.

Graduate Research Studentship, University of Waterloo *Jan. 2023–Jan. 2025*

- Departmental research funding covering full tuition and partial stipend for research-based Master of Mathematics studies.

Dean's List, New York University *Fall 2019–Spring 2022*

Dean's Honor List, University of California, Irvine *Fall 2018–Spring 2019*

SELECTED ADDITIONAL PROJECTS

Project reports are available on my website.

Polynomial Auditing for Black-Box DP Mechanisms *Winter 2026*

CS 860: Algorithms for Private Data Analysis University of Waterloo

- Proposed a polynomial upper-envelope framework for black-box auditing of differential privacy.

Modeling Drug Resistance in Bladder Cancer *Winter 2024*

AMATH 881: Introduction to Mathematical Oncology University of Waterloo

- Modeled spontaneous, drug-induced, and cancer stem cell related drug resistance in bladder cancer and compared dosage strategies under the same cumulative dosage.

TEACHING

Graduate Teaching Assistant, University of Waterloo *Waterloo, ON, Canada*

Computer Science (Sept. 2025–present): **CS 371** Intro to Computational Mathematics; **CS 335** Computational Methods in Business and Finance.

Applied Mathematics (Jan. 2023–Dec. 2024): **SYDE 211** Calculus 3; **MATH 137** Honors Calculus 1; **MATH 237** Honors Calculus 3; **AMATH 331** Applied Real Analysis; **AMATH 382** Computational Modelling of Cellular Systems.

Grader, Courant Institute, New York University *Sept. 2021–Dec. 2021*

MATH-UA 251 Intro to Mathematical Modeling; **MA-UY 4414** Applied Partial Differential Equations.

MENTORSHIP

Undergraduate Research Mentor *Jan. 2025–Apr. 2025*

Faculty of Mathematics, University of Waterloo Waterloo, ON, Canada

- Mentored two undergraduate students on circadian rhythm modeling.

SOFTWARE

Python (PyTorch, NumPy, SciPy), MATLAB, Git, SLURM, LaTeX