KAIXIN ZHENG

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EDUCATION

Doctor of Philosophy in Computer Science
University of Waterloo, Waterloo, ON, Canada | Sept. 2025-June 2029(expected)
Supervisor: Dr. Anita Layton

Master of Mathematics in Applied Mathematics (Thesis-based)
University of Waterloo, Waterloo, ON, Canada | 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"*

Bachelor of Science in Honors Mathematics; Minor in Computer Science
New York University, New York, NY, United States | Sept. 2019-May 2022
GPA: 3.89/4.0 (summa cum laude, top 5% across all majors)

Bachelor of Science in Physics (Transferred to New York University)
University of California, Irvine, Irvine, CA, United States | Sept. 2018-Jun. 2019
GPA:4.0/4.0

HONORS AND AWARDS

Women in Mathematics Mentorship Award, University of Waterloo Apr. 2029
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 15420/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

RESEARCH EXPERIENCE

Graduate Researcher
David R. Cheriton School of Computer Science, University of Waterloo
Waterloo, ON, Canada | Jan. 2025-present
Supervisor: Dr. Anita Layton
- Working on discovering governing equations in biological systems with machine learning.

Graduate Researcher
Applied Mathematics Department, University of Waterloo
Waterloo, ON, Canada | Jan. 2023-Jan. 2025

Supervisor: Dr. Anita Layton

- Utilized numerical PDE method to simulate mammalian kidney function.
- Focused on sex differences and circadian regulation on drug administration efficacy.
- Developed a flow-dependent nephron model to predict solute and water reabsorption in the rat kidney under AngII-induced hypertension (link).
- Developed a mathematical model of circadian rhythms in the kidney to analyze the impact of drug timing and circadian regulation in hypertension (link).

Undergraduate Research Assistant
Courant Institute of Mathematics, New York University
New York, NY, United States | Jun. 2021-Dec. 2021
Advisor: Dr. David McLaughlin

- Reviewed papers on calcium diffusion and PDE-based modeling in dendritic spines.
- Investigated calcium distribution in the spine head with analytic PDE methods.

PUBLICATIONS

Peer-reviewed:
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

Book Review:
Abo, S., Cheung, C. C., Dasgupta, R., Dutta, P., Hakimi, S., Kaur, A., ... & **Zheng, K.** (2023). Featured Review: Mathematical Modeling for Epidemiology and Ecology.

COURSE PROJECTS

A Comprehensive Model to Differentiate Spontaneous, Drug-induced, and CSCs-related Drug Resistance
Course: AMATH 881-Introduction to Mathematical Oncology
University of Waterloo | Winter 2024

- Modeled spontaneous, drug-induced, and CSCs-related drug resistance in bladder cancer.
- Quantitatively compared dosage strategies under the same cumulative dosage.
- Link: https://kaixin-zheng.github.io//projects/amath732

Lab Book on Asymptotic Analysis and Perturbation Theory
Course: AMATH 732-Asymptotic Analysis and Perturbation Theory
University of Waterloo | Fall 2023

- Created a lab book summarizing course concepts like asymptotic expansions, perturbation methods, and signal processing.
- Provided detailed proofs and MATLAB visualizations of normal modes in N-coupled oscillators.
- Link: https://kaixin-zheng.github.io//projects/AMATH881/

TEACHING

Graduate Teaching Assistant
Applied Mathematics Department, University of Waterloo
Waterloo, ON, Canada | Jan. 2023-Dec. 2024

- Courses taught:
  - SYDE 211: Calculus 3 (2023 Winter)
  - MATH 137: Honor Calculus 1 (2023 Fall)
  - MATH 237: Advanced Calculus 3 (2023 Fall)
  - AMATH 331: Applied Real Analysis (2024 Winter)
  - AMATH 382: Computational Modelling of Cellular System (2024 Winter)
- Responsibilities:
  - Evaluated assignments, quizzes, and exams with detailed feedback.
  - Facilitated weekly tutorial sessions and office hours.

Grader
Courant Institute of Mathematical Sciences, New York University
New York, NY, United States | Sep. 2021-Dec. 2021

- Courses graded:
  - MATH-UA.251 Introduction to Mathematical Modeling (2021 Fall)
  - MA-UY.4414 Applied Partial Differential Equations (2021 Fall)
- Responsibilities: Graded assignments, quizzes, and exams.

MENTORSHIP

Undergraduate Research Mentor
Faculty of Mathematics, University of Waterloo
Waterloo, ON, Canada | Jan. 2025-Apr. 2025

- Mentored underrepresented undergraduate students as part of the Women in Mathematics Directed Reading Program.
- Supported two mentees in a research project focused on circadian rhythm modeling.
- Provided guidance in independent study and preparation for a final presentation.

VOLUNTEER

Student representative at Math Grad Visit Day
Applied Mathematics Department, University of Waterloo
Waterloo, ON, Canada | Mar. 2024

- Participated in the prospective graduate student welcome event for the Applied Mathematics Department.
- Delivered a presentation as the student representative on the department and its programs.