

Zhijiang Ye



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EDUCATION

Emory University, Atlanta, GA 08/2022 - 05/2026 (*Expected*)
- Cumulative GPA: 3.992/4.000; Dean's List
- Bachelor of Science in Biology (*Honors in progress*); Major GPA: 4.000/4.000
- Bachelor of Science in Applied Mathematics; Major GPA: 4.000/4.000

RESEARCH EXPERIENCE

Sarafianos Lab, Laboratory of Biochemical Pharmacology, Emory School of Medicine Atlanta, GA
Undergraduate Researcher

PI: Dr. Stefan G. Sarafianos

Research Mentor: William McFadden, Ph.D. Candidate

Gallic Acid Displays Inhibitory Activity Against HIV-1 Capsid Protein 01/2024 - Present

- Drafting an honors thesis on the biochemical mechanism of the gallic acid's antiviral effect against the HIV-1 capsid protein
- Conducted Thermal Shift Assays (TSA) on common vitamins, organic acids, and acid metabolites to probe their binding activities to HIV-1 capsid hexamers, quantifying ΔT_m (melting point difference) to screen their antiviral activities. Identified gallic acid that demonstrates inhibitory activity
- Conducted Biolayer Interferometry (BLI) to extract kinetic constants for gallic acid and benchmark binding dynamics for capsid inhibitors such as PF74
- Performing X-ray Crystallography to obtain structures of gallic acid-bound HIV-1 capsid proteins

Development of Protrace, a Plate Reader Analysis Tool with GUI 06/2025 - Present

- Drafting as an honors thesis
- Developed *Protrace*, a cross-platform desktop app with a Python backend for multi-well microplate reader analysis (BioTek 96-well reader, Sartorius BLI, etc.) in a full pipeline setting (import, analysis, plotting, and export)
- Designed a user-friendly UI/UX for researchers with slight or no programming backgrounds, reducing the learning curve

Thermal Shift Analysis in R (TSAR) Package Algorithm Improvement 05/2025 - 08/2025

- Developed a *cubic-spline with beta-knots method*, a new curve-fitting approach, as a solution to the boundary-oscillation issue in the legacy model. Achieved a 30% L_2 -error reduction compared to the legacy model
- Incorporated the *cubic-spline with beta-knots method* as a callable function within the package and into the Shiny GUI

Hepatitis B Virus Protein Analysis 10/2023 - 12/2023

- Conducted data extraction and curation for protein analysis by manually compiling UniProt IDs for Hepatitis B Virus-related proteins

Department of Mathematics, Emory University Atlanta, GA
Independent Researcher

Research Advisor: Dr. Yuanzhe Xi

Reinforcement Learning for Multigrid Tuning of HYPRE 09/2025 - Present

- Implementing a reinforcement learning-based tuner for *HYPRE BoomerAMG* that learns a policy over the joint action space of selected parameters and adjusts them between runs
- Testing different reinforcement learning setups and benchmarking them against *GPTune* and *GPTuneBand* to evaluate stability and sample efficiency

Department of Mathematics, Emory University

Atlanta, GA

Independent Researcher

Research Advisor: Dr. Alessandro Veneziani

Quantitative Hybrid Model for Wear Estimation

01/2025 - 05/2025

- Co-authored and published in *ICDSIS 2025 (IEEE)*
- Proposed a *bimodal beta model* for probabilistic prediction of footprint. Validated the footstep patterns via Brownian-motion simulation and fit the model parameters via a KDE grid search
- Proposed *HEWAN (Hybrid Euler-Bernoulli-Winkler-Archard with Natural Factors)* model with an analytic solution, which quantifies the dynamic pressure on the structural load of the tread via a piecewise Euler-Bernoulli/Winkler beam with Archard theory and environmental effects.
- Developed a LiDAR-integrated inverse *HEWAN* method to estimate tread-use patterns from scanned spatial features of the worn tread, facilitating industrial applications
- Designed original illustrations and figures to clearly communicate the research workflow and outcomes

Junkipedia, National Conference on Citizenship (NCoC)

Atlanta, GA (Hybrid)

Year-long Research Internship

Supervisor: Cameron Hickey, CEO of NCoC

Hierarchical Weak-supervision for Text Classification

07/2025 - Present

- Established a two-stage LLM weak-supervision pipeline for *Junkipedia* post classification. Validated on 24,000+ posts and deployed by *Junkipedia*
- Performed time series modeling on classified *Junkipedia* posts. Presented the methods and results as a poster at *AI.Xperience 2025 at Emory*
- Utilizing Non-negative Matrix Factorization (NMF) to summarize domain vocabularies. Implemented Sentence-BERT embeddings and clustering analysis for context-aware grouping and customizable domains

PUBLICATIONS

- [1] *Preprint submitted to bioRxiv; planned submission to mBio* McFadden, W. M.[†], Gao, X.[†], **Ye, Z.**[†], Wen, X., Lorson, Z. C., Zhang, H., Fahim, J., Emanuelli, A., Kirby, K. A., & Sarafianos, S. G. (2025). "TSAR, Thermal Shift Analysis in R, identifies endogenous molecules that interact with HIV-1 capsid hexamers.", 2025. *bioRxiv*. DOI: 10.1101/2023.11.29.569293.
- [2] *In submission to Scientific Reports (Nature Portfolio)* Tran, T. Q. M., Erkelens, B., **Ye, Z.**, N. V. N. Tran, Vinh, T., Jun, L. W., Ho, L., Nguyen, L., Huynh T. B. Chau, Al Diab Al Azzawi, M., Tran, L., Thuy, D. H. D., Tran, P., Le, M. H. N., & Huy, N. T. (2025). "Impact of APOE4 Genotype on Efficacy and Safety of Monoclonal Antibody Therapies in Alzheimer's Disease.", 2025.
- [3] He, E.[†], **Ye, Z.**[†], & Zou, C.[†] (2025). "Quantitative Hybrid Structure Analysis of Equipment Wear under Dynamic Pressure based on Digital Intelligent Algorithm." *2025 3rd International Conference on Data Science and Information System (IEEE)*, May 16-17, 2025. DOI: 10.1109/ICDSIS65355.2025.11071008.

[†] These authors contributed equally.

PEER-REVIEWED SOFTWARE

[1] *In preparation; planned update to the Bioconductor TSAR* Gao, X., McFadden, W. M., **Ye, Z.**, & Sarafianos, S. G. (2025). "TSAR: Thermal Shift Analysis in R (v1.9.1) [R package]." *Bioconductor*, 2025. (Existing package: *TSAR: Thermal Shift Analysis in R*. Bioconductor. DOI: 10.18129/B9.bioc.TSAR.)

PRESENTATIONS & POSTERS

[1] Wei, A.[†], He, E.[†], & Han, J.[†], **Ye, Z.**[†] (2025). "Engaging Constituents: How 2024 U.S. Federal Election Candidates Communicate Civic Participation Opportunities." *AI.Xperience 2025, Emory University Center of AI Learning*, August 6, 2025.

[†] These authors contributed equally.

TEACHING EXPERIENCE

Teaching Assistant, Emory University Department of Biology <i>Supervisor: Dr. Megan F. Cole</i> - Guided students in biology lab courses (BIOL 141L and 142L), assisting with experiment setup and concept explanation, ensuring safe and rigorous lab techniques - Facilitated with the lab instructor through material preparation. Assisted with supervision, reinforcing lab adherence	08/2023 - 12/2024 Atlanta, GA
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LEADERSHIP & SERVICE EXPERIENCE

Undergraduate Volunteer, Winship Cancer Institute Department of Hematology <i>Winship Cancer Institute</i> - Transferred lab samples of patients from the hematology clinic to the processing lab - Supported patients with wayfinding and general inquiries	08/2024 - 05/2025 Atlanta, GA
Vice President, Emory University MatheMatics Association (EUMMA) <i>Emory University</i> - Led executive board meetings, coordinated event planning, and coordinated room reservations for organization events - Trained members on math modeling, introduction to AI, and Kaggle competitions	08/2025 - Present Atlanta, GA
Secretary, Emory University MatheMatics Association (EUMMA) <i>Emory University</i> - Scheduled events, managed organizational calendars, and sent timely reminders to ensure high engagement and smooth operation of activities	03/2023 - 08/2025 Atlanta, GA
Peer Mentor, Emory Chinese Student Association (ECSA) <i>Emory University</i> - Helped freshman undergraduates and incoming transfer students in college life, sharing with them my experience in college and academic advice - Led a group for mentees with similar interests and intended majors. Answered questions and concerns related to college life	07/2023 - 12/2023 Atlanta, GA

HONORS & AWARDS

Meritorious Winner (globally top 6%), Mathematical Contest in Modeling (MCM)	Spring 2025
Fellowship Holder, Emory Pathways Global Award	Spring 2025
Finalist, American Statistical Association (ASA) DataFest 2025	Spring 2025
Creative Intelligence Award, Atlanta Mathematics of Data Science Bootcamp	Spring 2025

PROFESSIONAL COMPETENCIES

Information Technology

- Core Competencies: Numerical analysis, data analysis, mathematical and statistical modeling, machine learning, deep learning, reinforcement learning, package development
- Programming: Python, R, Java, JavaScript, HTML/CSS
- Computational Biology & Structural Tools: BLAST, UniProt, PDB, PyMOL, ChimeraX, AlphaFold
- Computational Chemistry & Molecular Modeling: Spartan
- Scientific Illustration & UI/UX: Python/R visualization, Figma, ChemDraw, BioRender
- Typesetting: \LaTeX , Markdown

Language

- Mandarin Chinese: Native
- English: Fluent
- Japanese: Elementary

RELEVANT ADVANCED COURSEWORK

B.S. in Biology

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| - Human Physiology | <i>Spring, Sophomore</i> |
| - Organic Chemistry I, Organic Chemistry I Lab | <i>Summer, Sophomore</i> |
| - Organic Chemistry II, Organismal Form and Function | <i>Fall, Junior</i> |
| - Organic Chemistry II Lab, Cell Biology, Biochemistry | <i>Spring, Junior</i> |
| - Evolutionary Biology, Biotechnology and Molecular Biology | <i>Fall, Senior</i> |
| - HIV Epidemiology, Molecular Toxicology | <i>(Expected) Spring, Senior</i> |

B.S. in Applied Mathematics

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| - Linear Algebra (Honors), Ordinary Differential Equations | <i>Fall, Freshman</i> |
| - Multivariable Calculus and Discrete Math (Honors) | <i>Spring, Freshman</i> |
| - Mathematical Statistics I, Programming for Math of Data Science (Python) | <i>Fall, Sophomore</i> |
| - Mathematical Statistics II, Partial Differential Equations, Physics E&M | <i>Spring, Sophomore</i> |
| - Numerical Analysis | <i>Fall, Junior</i> |
| - Numerical Differential Equation, Intro to Computer Science II | <i>Spring, Junior</i> |
| - Probabilistic Machine Learning | <i>Fall, Senior</i> |
| - Non-Linear Optimization | <i>(Expected) Spring, Senior</i> |

ADDITIONAL INFORMATION

Links

- LinkedIn: <https://www.linkedin.com/in/zhijiangye>
- GitHub: <https://github.com/Chloriiin>
- Personal Website: <https://chloriiin.github.io>

Hobbies

Bass Performance, Band, Music Composition, Chinese Cuisine