Zhijiang Ye

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EDUCATION

Emory University, Atlanta, GA 08/2022 - 05/2026 *(Expected)*
- Cumulative GPA: 3.992/4.000
- *(Honors)* Bachelor of Science in Biology: 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*
Research Assistant
PI: Dr. Stefan G. Sarafianos
Supervisor: 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, GUI-embedded protein assembly assay analysis tool 06/2025 - Present
- Drafting as an honors thesis
- Developed *Protrace*, a cross-platform (Tauri) desktop app with Python backend for multi-well microplate reader analysis (BioTek 96-well reader, Sartorius BLI, Thermo Fisher QuantStudio, etc.) with a full pipeline (import, analysis, plotting, and export)
- Designed user-friendly UI/UX for researchers with slight or no programming backgrounds, and reduced the learning curve

Thermal Shift Assay 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

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

Department of Mathematics, Emory University *Atlanta, GA*

Independent Researcher

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 hyperparameters and adjusts them between runs
- Testing different reinforcement learning setups and benchmarking them against *GPTune* and *GPTuneBand* to evaluate stability and sample efficiency

Junkipedia, National Conference on Citizenship (NCoC) *Atlanta, GA (Hybrid)*

Year-long Research Internship

Supervisor: Cameron Hickey

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] 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 (ICDSIS)*, May 16-17, 2025. DOI: 10.1109/ICDSIS65355.2025.11071008

[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] *Manuscript in preparation; planned submission to bioRxiv and subsequently Microbiology Spectrum* McFadden, W. M.†, Gao, X.†, **Ye, Z.†**, Wen, X., Lorson, Z. C., Zheng, H., Fahim, J., Emanuelli, A., Kirby, K.

A., & Sarafianos, S. G. (2025). "Thermal Shift Analysis in R (TSAR) identifies folic acid as a molecule that interacts with HIV-1 capsid.", 2025.

[4] Gao, X., McFadden, W. M., **Ye, Z.**, & Sarafianos, S. G. (2025). "TSAR: Thermal Shift Analysis in R (v1.9.0) [R package]." *Bioconductor*. DOI: 10.18129/B9.bioc.TSAR

† *These authors contributed equally.*

PRESENTATIONS & POSTERS

[1] **Ye, Z.**†, He, E.†, Wei, A.†, & Han, J.† (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 08/2023 - 12/2024
Supervisor: Dr. Megan F. Cole *Atlanta, GA*
- 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

LEADERSHIP & SERVICE EXPERIENCE

Undergraduate Volunteer, Winship Cancer Institute Department of Hematology 08/2024 - 05/2025
Winship Cancer Institute *Atlanta, GA*
- Transferred lab samples of patients from the hematology clinic to the processing lab
- Supported patients with wayfinding and general inquiries

Vice President, Emory University MatheMatics Association (EUMMA) 03/2023 - Present
Emory University *Atlanta, GA*
- Scheduled events, managed organizational calendars, and sent timely reminders to ensure high engagement and smooth operation of activities
- Trained members on mathematical modeling and Kaggle competitions

Peer Mentor, Emory Chinese Student Association (ECSA) 07/2023 - 12/2023
Emory University *Atlanta, GA*
- 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

HONORS & AWARDS

Meritorious Winner (globally top 6%), Mathematical Contest in Modeling (MCM) *Spring 2025*
Fellowship Holder, Emory Pathways Global Award *Spring 2025*
Dean's List, Emory College of Arts and Sciences *Fall 2022, Fall 2023 - Spring 2025*
Finalist, American Statistical Association (ASA) DataFest 2025 *Spring 2025*
Creative Intelligence Award, Atlanta Mathematics of Data Science Bootcamp *Spring 2025*

INTERESTS

Research Interests
- Biochemistry and Molecular Biology: biochemical mechanisms, inhibitory actions, drug discovery
- Structural Biology: atomic-level molecular interactions, biophysical assays

- Genetics and Epigenetics: gene regulation, chromatin dynamics, CRISPR
- Computational & Machine Learning Methods for Biology: mathematical modeling, AI drug discovery

Hobbies

Bass Performance, Band, Music Composition, Chinese Cuisine

PROFESSIONAL COMPETENCIES

Information Technology

- Core Competencies: Numerical analysis, data analysis, mathematical and statistical modeling, machine learning, deep learning, package development
- Programming: Python, R, Java, JavaScript, HTML/CSS
- Scientific Illustration and UI/UX: Python/R visualization, Figma, Adobe Photoshop
- Typesetting: LaTeX, Markdown

Language

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

RELEVANT COURSEWORK

B.S. in Biology

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

B.S. in Applied Mathematics

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

ADDITIONAL INFORMATION

Links

- Linkedin: https://www.linkedin.com/in/zhijiangye
- GitHub: https://github.com/Chloriiin
- Personal Website: https://chloriiin.github.io
- Stefan Sarafianos Lab: https://sarafianoslab.com