Darren Liu

Biophysics Ph.D. Graduate Student | University of Chicago

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Summary

- Molecular biologist with expertise in high-throughput assay development, laboratory automation, and chemical biology.
- Biophysicist with expertise in analyzing high-dimensional biological datasets, protein language models, and building biologically informed computational models.
- Interdisciplinary collaborator with deep knowledge in many fields such as molecular evolution, dimensionality reduction, and DNA sequencing.

Education

University of Chicago 2022-present

Ph.D. Biophysical Sciences. PI: Aaron Dinner and Arvind Murugan

- Research Interests: protein evolution, automated liquid handling (robots, acoustic), dimensionality reduction, protein language models, chemical biology, machine learning

University of Chicago 2022-2023

M.S. Biophysical Sciences

Boston University 2018-2022

B.A. in Chemistry: Biochemistry. Double minors in Biology and Computer Science

Research and Work Experience

University of Chicago 2022-present

Graduate Student. PI: Aaron Dinner, Arvind Murugan, Department of Biophysical Sciences

- Developed a high-throughput automated plaque assay workflow integrating viral molecular evolution, liquid handling, and image segmentation to characterize protein evolvability.
- Built several families of Ising models to identify key parameters governing evolvability

Boston University School of Medicine 2022

Undergraduate Researcher. PI: William Lehman, Department of Pharmacology, Physiology & Biophysics

- Simulated tropomyosin point mutations with molecular dynamics (NAMD)
- Connected molecular changes to disease phenotypes (hypertrophic cardiomyopathy)

Stanford University Summers of 2018-2022

Undergraduate Researcher. PI: Julia Salzman, Department of Biochemistry

- Implemented classical and machine learning image segmentation methods for spatial transcriptomics.
- Mapped relationships between gene expression and viral load in COVID-positive patients
- Developed and evaluated models to extract RNA isoform information from MERFISH image data

Teaching and Service

Center for Living Systems Chalk Talk Organizer 2025-present

Organizer for Chalk Talk seminar series

University of Chicago Teaching Assistant 2024

Created assignments, graded coursework, and lectured for "Computational Biology in Microbial Ecosystems" with PI Seppe Kuehn

UCOMBO 2022-present

Volunteer. Taught computational biology (Python, DNA) in elementary, middle, and high schools

GirlsWhoCode 2022

Volunteer. Taught fundamentals of coding to girls in elementary and middle school

@rtifice 2022-2023

Volunteer. Taught middle school kids basics of circuits and coding

Boston University Chemia 2020-2022

Volunteer. Tutored undergraduates in organic and physical chemistry

MVLA Aspire 2017

Volunteer. Provided free ACT tutoring for students

Skills

- Programming: Python (NumPy, PyTorch, SciPy, Biopython, Jupyter, Sci-kit Learn), High-Performance Computing (SLURM, bash), Git, LaTeX
- Computation: Dimensionality reduction, clustering, regression, protein langauge models (ESM2), molecular dynamics (NAMD), AlphaFold, VMD/PyMOL, image segmentation (ImageJ, OpenCV, scikit-image, PyTorch), sequencing analysis
- Wet Lab: Assay development, automated liquid handling (Tecan Fluent, Echo Acoustic Liquid Handler), plate readers (fluoresence and absorbance assays), directed molecular evolution, cell culture and cloning, DNA sequencing

Publications

I. Firlar, M. Rynkiewicz, J. Creso, **D. Liu**, J. Moore, W. Lehman, S. Campbell. Predictive genotype-phenotype correlation of four tropomyosin-1 variants of unknown significance. (2023) Biophysical Journal, Volume 122, Issue 3, 121a

Presentations and Posters

Mapping the evolvability of molecular specificity across a protein family. **Poster, Gordon Research Conference on Molecular Mechanisms in Evolution** (June 2025)