Stanley Nicholson

stanley_nicholson@brown.edu ◆ (773)-502-9438 ◆ Providence, RI ◆ stanleynicholson.com

Education

GPA

Brown University

– Applied Mathematics PhD
– NSF GRFP Fellow
– Expected graduation 2028

Illinois Institute of Technology (IIT)

BS: 3.96/4.0, MS: 4.0/4.0

– Joint Bachelor and Masters of Science in Applied Mathematics
– Minors in Computer Science and Bioinformatics
– Camras Scholarship (Full-tuition)

Research Interests

Mathematical and Computational Biology ◆ Stochastic Processes ◆ PDE Multiscale Modeling

Relevant Coursework

Real and Complex (Audited) ◆ Analysis ◆ Functional Analysis ◆ Measure Theoretic Probability ◆ Linear Algebra I/II ◆ Partial and Ordinary Differential Equations ◆ Stochastic Dynamics ◆ Numerical ODE, PDE, and Linear Algebra ◆ Abstract Algebra ◆ Topology (Audited) ◆ Mathematical Statistics

Cell Biology ◆ Biochemistry ◆ Computational Biochemistry ◆ Bioinformatics ◆ Genetics

Electricity and Magnetism ◆ Continuum Mechanics (Audited) ◆ Digital Signal Processing

Experience

Researcher in Mathematical and Computational Biology **December 2021 – Present**

- Developing and establishing mechanical theory of biochemical interactions using stochastic estimation of molecular dynamics simulations with Bob Eisenberg and David Minh at IIT
- Employing computational packages such as **NumPy, MATLAB, OpenMM** on UCSD's supercomputing center Expanse to generate and analyze molecular dynamics simulations
- Collaborating with postdoc at the NIH's National Institute on Drug Abuse to develop theory of opioid binding to the -opioid receptor using the coherence function
- Presenting paper in ACS Omega at Joint Mathematical Meeting 2023, see **Publications**

Co-founder and Lead Engineer of Receptify **October 2021 – May 2022**

- Cofounded the startup Receptify: a student-first web-based platform meant to provide justice and a clear path to resources for survivors of sexual violence on college campuses
- Awarded Socially Responsible Modelling (SoReMo) Fellowship to research feature set and design parameters for web app to support survivors of sexual violence
- Secured $19,000 in grant support from the Grainger Foundation, the Kaplan Institute, and the SoReMo Initiative to develop the platform and forge a partnership with IIT
- Initiated and attempted $300,000 joint IIT-Receptify DOJ federal grant to pilot software with IIT

Researcher in COVID Drug Modeling **August 2021 – December 2021**

- Established a novel and more applicable statistical technique for analyzing drug-dose response for COVID Moonshot project with David Minh and Lulu Kang at IIT
- Demonstrated theoretical robustness of statistical model through numerical simulations
- Awarded $1000 RES-Match grant from IIT's Pritzker Institute of Biomedical Science and Engineering
- Paper in ACS Medicinal Chemistry, see **Publications**

Researcher in Bridge-Pedestrian Dynamics **June 2021 – August 2021**

- Developed and simulated coupled bridge-pedestrian dynamics model with pedestrian traffic model under supervision of Igor Belykh at Georgia State University
- Demonstrated that increases in pedestrian traffic lead to dangerous bridge instability
- Perused and analyzed current literature for methods to both develop and curate model
- Lead collaboration and meetings between three other REU participants alongside Ph.D. student and research professors

Researcher in Stochastic Modeling and Machine Learning **September 2020 – June 2021**

- Applied stochastic modeling to transcription factor regulation with Jinqiao Duan at IIT and Romit Maulik at Argonne National Laboratory
- Utilized machine learning algorithms (normalizing flows) via **PyTorch** and **NumPy** to analyze noisy high-dimensional data
- Awarded $1000 RES-Match grant from IIT's Pritzker Institute of Biomedical Science and Engineering
- Presented work at Symposium for Undergraduates in the Mathematical Sciences (SUMS) conference at Brown University on March 14, 2021

Developer for Single Cell RNA Data Visualizer **June 2020 – September 2020**

- Designed early stages of single cell RNA-sequence data visualizer with Dr. Natalia Maltsev at the University of Chicago
- Implemented web app for analyzing and visualizing RNA-Seq data using **pandas**, **NumPy, Matplotlib**, **chart.js**, and **d3.js**

Awards

- Passed IIT's graduate qualifying exams in Applied Analysis and Probability at Ph.D. level
- Outstanding Graduate Research Award for IIT's Annual Student Poster Day (Link to my poster)
- First Place ($5000) in aSweatLife Pitch Competition for Receptify
- Third place ($5000) in Grainger's Technology Innovation Competition for Social Good for Receptify
- Third place ($2000) in Audience Choice Award for Kaplan Institute Pitch Tank for Receptify

Technical Skills

Python (*6 years*), MATLAB (*3 years*), LaTeX (*3.5 years*), React, Java, C#, SQL (*1.5 years*)

Publications

- **S. Nicholson**, D. Minh, B. Eisenberg, *"H-bonds in Crambin: Coherence in an α-helix"; ACS Omega* (https://pubs.acs.org/doi/full/10.1021/acsomega.3c00181)
- V. La, **S. Nicholson**, A. Haneef, L. Kang, D. Minh, *"Including control data in fits to concentration-response curves improves estimates of half-maximal concentrations"; ACS Medicinal Chemistry (*https://pubs.acs.org/doi/10.1021/acs.jmedchem.3c00107*)*
- *In Progress*: K. Daley, **S. Nicholson**, I. Jibre, A. Champneys, and I. Belykh, *"Crowd heterogeneity-induced instabilities of footbridges"*

Presentations

- October 2022 – Midwest Enzyme Conference: *"H-bonds in Crambin: Coherence in an α-helix"*
- October 2022 – St. Jude National Undergraduate Symposium: *"H-bonds in Crambin: Coherence in an α-helix"*
- October 2022 – UT Southwestern Computational Biology Program Retreat: *"H-bonds in Crambin: Coherence in an α-helix"*
- November 2022 – IIT SIAM Chapter: "*My Favorite Theorem -- The Feynman-Kac formula: the Bridge between Stochastic and Partial Differential Equations"* (Link to video)
- January 2023 – Joint Mathematical Meeting: *"Linear Systems Analysis of Atomic Interactions using Molecular Dynamics"*
  - Pi Mu Epsilon Undergraduate Student Poster Session I
  - AMS-BIO SIGMAA Special Session on Undergraduate Research Activities in Mathematical and Computational Biology II
- May 2023 – SIAM Conference on Applications of Dynamical Systems: *"Crowd heterogeneity-induced instabilities of footbridges"*
  - Minisymposium on "Disorder-promoted cooperative dynamics"

Extracurricular

Teaching Assistant for Multivariate Calculus **August 2022 – May 2023**

- Taught a recitation/discussion section and grade quizzes for 50+ students

President of the Machine Learning Club **August 2021 – May 2023**

- Organized bi-weekly ML seminars and career development workshops for 200+ person club
- Hosted hackathon in 2021 and forging partnerships with Chicago-area ML/AI student organizations such as Northwestern and companies like Blue Cross Blue Shield

Member of Society for Industrial Applied Mathematics Chapter **August 2021 – Present**

- Organize, plan, and participate in weekly meetings on mathematics and guest lectures