Juliet Jiang

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Education

DUKE UNIVERSITY Durham, NC
B.S.E in Biomedical Engineering | B.S in Mathematics Expected 5/2025
GPA: 3.96/4.0
Relevant Courses: Machine Learning and Theory, Stochastic Processes, Stochastic Calculus, Numerical Analysis, Differential Equations, Signals and Systems, Physiology & Biostatistical Applications, Data Structures & Algorithms, Advanced Probability

Research & Work Experience

DUKE PRATT SCHOOL OF ENGINEERING Durham, NC
Pratt Research Fellow, Dr. Timothy Dunn Lab 11/2023-Present

- Implemented an auto-regressive hidden Markov model (AR-HMMs) to determine and classify behavioral syllables in Parkinson's disease patients
- Evaluating the identifiability and sampling efficacy of parameters in non-parametric AR-HMMs

DUKE PRATT SCHOOL OF ENGINEERING Durham, NC
Undergraduate Researcher, Dr. Amanda Randles Lab 10/2022-8/2024

- Analyzed the sensitivity of HARVEY, a massively parallel computational fluid dynamics (CFD) code, to a range of heart rates and its effect on hemodynamic metrics such as wall shear stress and velocity
- Investigated vorticity as a new clinical biomarker by analyzing patient-specific CFD simulations across a range of disease severity
- Evaluated whether steady-state CFD simulations can recapitulate hemodynamic profiles found with pulsatile waveforms

DUKE SCHOOL OF MEDICINE Durham, NC
Undergraduate Researcher, Advisors: Dr. Jeffrey Petrella, Dr. Wenrui Hao (Penn State) 1/2022-Present

- Refined a computational causal model simulating the Biomarker Cascade Theory behind Alzheimer's Disease
- Replicated entire model from MATLAB to Python manually and assessed performance through parameter evaluation, cluster analysis, and sensitivity analysis
- Characterized the identifiability of model parameters against the quality and quantity of subject-specific medical data

MODERNA, INC. Norwood, MA
Analytical Development Intern 6/2023-8/2023

- Identified and characterized oligonucleotide-related impurities in an RNase 5' cap digest using liquid chromatography-mass spectrometry (MS) and MS/MS

DUKE UNIVERSITY Durham, NC
DoMath Summer Researcher, Advisor: Dr. Thomas Witelski 5/2022-7/2022

- Analyzed physical processes of particle-laden flow in a simplified, symmetric 2D cross-section of a micro-scale pore
- Constructed a system of non-dimensional, computationally-scaled partial and stochastic differential equations, implemented using MATLAB

Publications & Presentations

Refereed Conference & Journal Publications

- Huber, M.*, **Jiang, J.***, Tanade, C., Randles, A. (2024). Identifying When Steady-State Flow Simulations In Patient-Specific Coronaries Recapitulate Pulsatile Flow Dynamics. In *2024 46th Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC)*. IEEE.

- Petrella, J. R., **Jiang, J.**, Sreeram, K., Dalziel, S., Doraiswamy, P. M., Hao, W., & Alzheimer's Disease Neuroimaging Initiative. (2024). Personalized Computational Causal Modeling of the Alzheimer Disease Biomarker Cascade. *The journal of prevention of Alzheimer's disease*, 11(2), 435-444.
- **Jiang, J.**, Zhang, R., & Jeong, D. (2023). Particle Deposition Driven by Evaporation in Membrane Pores and Droplets. *SIAM Undergraduate Research Online*, 16.

Conference Abstracts

- **Jiang, J.**, Huber, M., Ladd, W., Tanade, C., Randles, A. (2023). Hemodynamic sensitivity to heart rate in the coronary arteries. Biomedical Engineering Society Annual Meeting. Seattle.
- Huber, M., **Jiang, J.**, Tanade, C., Randles, A. (2023). Vorticity as a Predictive Marker for Adverse Cardiac Events in Coronary Artery Disease. Biomedical Engineering Society Annual Meeting. Seattle.

Guest Lectures

- August 8-9th 2024: Invited Speaker at the Mathematical Biosciences Workshop at Penn State University in State College, PA.
- November 4th 2022: Invited Speaker (out of 3) at the UNC Analysis and PDE Research Group's online seminar for undergraduate research in analysis, NC.

Teaching Experience: TA & Tutoring

Teaching Assistant at Duke University 1/2024-5/2024

- Graduate-level Numerical Analysis: facilitated recitation and graded assignments, answered questions on Ed Discussion

STEM Advancement through Group Engagement (SAGE) Facilitator at Duke University 9/2023-12/2023

- Ordinary and Partial Differential Equations: prepared lectures and led weekly group tutoring sessions

Awards & Honors

Funding Awards

Goldwater Scholarship Recipient 2024
National award for excellence in undergraduate research

The Tau Beta Pi Engineering Honor Society 2023
Oldest, largest, and most prestigious engineering honor society in the United States

Student Innovation Challenge, Product Development & Management Assoc., Carolina Chapter 2022
Recognition of outstanding student innovation in product development
3rd Place, EZ Drainz Pitch (wheelchair drainage storage system)

Duke SPIRE (STEM Pathways for Inclusion, Readiness, and Excellence) Fellow 2021
Academic support system with enrichment funds centering on inclusivity, retention, and support for underrepresented students in STEM

Departmental Awards

First-Year Julia Dale Prize 2022
Duke Math Department's highest award for first-year students

Professional Activities

Duke University Math Union Co-President 9/2023-5/2024

- Organized and hosted the first Duke Math Meet in China (300+ attendees) at Duke Kunshan University, a preliminary competition for international students for participation in the annual Duke Math Meet
- Organized and hosted speaker events (3Blue1Brown, 260+ attendees) to promote undergraduate engagement with math on campus
- Co-organized the Duke University Math Meet with high school attendees all over the world
- Organized monthly social events, graduate student panels, math game tournaments

Society of Women Engineers First Year Representative 11/2021-5/2022

- Worked with executive team to brainstorm and host social events for women in the Pratt School of Engineering

Global Alliance of Medical Innovation Member 10/2021-5/2022

- Corneal Endothelium Diagnostics Project Team: Programmed code that skeletonized images of hand-drawn outlines of corneal endothelial cell boundaries to test a machine learning model

Outreach

Duke Math Circles 10/2024-Present

- Led sessions that expose elementary students in the Durham community to math problems through games that involve strategic and critical thinking

Prison Math Project Penpal 10/2024-Present

- Exchanging letters with an incarcerated individual in the Women's Therapeutic Residential Center in Tennessee

Skills & Interests

Technical: Python, LaTeX, MATLAB, Java, C, OpenMP, MPI, parallel computing, COMSOL, Paraview, BrainSuite
Interests: Dance, rhythmic gymnastics, piano, public math education, ornithology, LGBTQ+