

CONTACT INFORMATION	<b>School of Mathematics</b> <b>Georgia Institute of Technology</b>	<i>Cell Phone:</i> (424) 521-1383 <i>Email:</i> jliu3203@gatech.edu
EDUCATION	<b>Georgia Institute of Technology</b> , Atlanta, GA Ph.D. in Mathematics, expected in 2029 M.S. in Computational Science and Engineering, expected in 2027 <b>University of Michigan</b> , Ann Arbor, MI B.S. in Honors Mathematics, with a Minor in Computer Science M.S. in Mathematics through the Concurrent Undergraduate Graduate Studies (C.U.G.S.) Program	2024 - 2029 2020 - 2024
PAPERS	<i>On absolutely friendly measures on <math>\mathbb{Q}_S^d</math></i> , with Shreyasi Datta. Published in <i>Mathematika</i> 70 (2024), no. 3, Paper No. e12256. ( <a href="#">arxiv</a> ) <i>Transition densities of brownian motions on metric graphs</i> (Expository paper written as part of the Indiana REU 2023 with Professor Wai-Tong Fan) ( <a href="#">PDF</a> ) <i>Metric diophantine approximation on non-degenerate manifolds</i> (Expository paper written as part of the Michigan Math REU 2022 with Professor Shreyasi Datta) ( <a href="#">PDF</a> )	
TALKS	I gave talks at: <ul style="list-style-type: none"> <li>• Joint Mathematics Meetings 2024</li> <li>• Indiana Undergraduate Math Research Conference 2023</li> <li>• University of Michigan Mathematics REU Seminar 2022</li> </ul>	
SCHOLARSHIPS AND AWARDS	<b>Georgia Institute of Technology</b> GAANN Fellowship <b>University of Michigan</b> Donald J. Lewis Mathematical Merit Scholar Award M.S. Keeler Mathematics Merit Scholarship	2024 2024 2023
PROGRAMMING PROJECTS	<b>TASEP Simulator</b> <ul style="list-style-type: none"> <li>• Used Python to code a simulator for the TASEP and a visualizer for the corner growth process associated with it. Also coded visualizations for the scaled height function and how it compares to the theoretical limiting Tracy-Widom distribution, as well as the hydrodynamic limit.</li> </ul> <b>Identifying Dog Breeds</b> <ul style="list-style-type: none"> <li>• Used PyTorch and trained a CNN to classify dogs between two different breeds (Collies and Golden Retrievers).</li> </ul>	Fall 2023 - Winter 2024 Fall 2022

- Implemented transfer learning, data augmentation techniques, and fine-tuned the model to achieve a final test accuracy of 0.82.

### **American Sign Language Translation**

Winter 2022

- Trained three models (ResNet-50, ResNeXt-50, and an RNN) to translate American Sign Language (ASL) into text, using the Word-Level American Sign Language (WLASL) dataset. The RNN model achieved a test accuracy of 0.285.

### **Algorithmic Game Theory**

Summer 2021

- Conducted an independent study in algorithmic game theory under the mentorship of a PhD student and implemented a reinforcement learning (Q-learning) algorithm for the Iterated Prisoner's Dilemma game in Python.

### ADVANCED MATHEMATICS COURSEWORK

(\*) indicates coursework taken at Michigan. (†) indicated coursework taken at Georgia Tech.

- (\*) Measure Theory
- (\*) Complex Analysis
- (\*) Probability Theory and Stochastic Processes
- (\*) Theoretical Statistics
- (\*) Topology
- (\*) Abstract Algebra
- (\*) Number Theory
- (†) Stochastic Calculus
- (†) High Dimensional Probability and Statistics
- (†) Partial Differential Equations
- (†) Functional Analysis
- (†) Statistical Physics in Algorithms and Combinatorics

### OTHER SKILLS

#### **Computer Science/Statistics**

- (\*) Data Structures and Algorithms
- (\*) Machine Learning
- (\*) Computer Vision
- (\*) Multivariate Statistical Analysis

#### **Programming Experience**

- Comfort with high-level programming languages like C++, Python, and MATLAB.
- Experience with NumPy, SKL, Pandas, PyTorch, etc.

## TEACHING

### Georgia Institute of Technology

#### Graduate Lecture Assistant

- Math 3235: Probability Theory Spring 2025

#### Graduate Teaching Assistant

- Math 1552: Integral Calculus Fall 2024

### University of Michigan

#### Course Assistant

- Math 396: Honors Analysis II Winter 2024
- Math 395: Honors Analysis I Fall 2023

#### Grader

- Math 526: Discrete State Stochastic Processes Winter 2024
- Math 417: Matrix Algebra I Summer 2023
- Math 451: Advanced Calculus I Spring 2023
- Math 217: Linear Algebra Winter 2023
- Math 217: Linear Algebra Fall 2022
- Math 217: Linear Algebra Spring 2022

## VOLUNTEERING

### Math Corps

- College Assistant for Ypsilanti Math Corps, an outreach mathematics summer camp for middle school students in Summer 2024.

### University of Michigan Math Circle

- Student volunteer for Math Circle, an outreach program for middle and high school students who love mathematics.

### Society of Undergraduate Mathematics Students (SUMS)

- Attend monthly meetings on organizing activities and initiatives to increase engagement with mathematics majors and help create a more welcoming environment in the department.
- Led efforts to organize weekly Undergraduate Tea Time, an opportunity for math majors to socialize and relax once a week along with free tea and cookies.
- Joined the executive board as an Events Coordinator in Fall 2023.

## LANGUAGES

Native English Speaker, Fluent in Mandarin Chinese.