

## EDUCATION

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<b>Ph.D. Candidate, Data Science</b> , New York University, Center for Data Science	2020-Present
<i>Advisors:</i> Julia Stoyanovich, Joshua R. Loftus   <i>Area:</i> responsible AI, causal inference, algorithmic inequality   GPA: 3.9 In my research, I use causal inference and statistics to better understand bias and inequality in AI systems, machine learning, and algorithmic decision making. This work includes developing tools for inequality-aware decision making and more wholistic algorithmic fairness, leveraging counterfactual reasoning to improve model explainability and reduce pre-existing disparities, and reimagining how we use causal modeling formalisms to reason about social categories like race and gender.	
<b>B.Sc., Data Science</b> , Harvey Mudd College	2014-2018
<i>Superior Academic Performance (2014), Dean's List (2014 – 2017), Graduate with Distinction (2018)</i>   GPA: 3.7	
<b>Henry A. Krieger Prize in Decision Sciences</b> , Mathematics Department	2017
<i>Annual award presented to rising senior students who show particular promise in probability, statistics, or operations research</i>	
L'Université de Toulouse / L'Institut d'études politiques de Toulouse, France (Study Abroad)	Spring 2017

## FUNDING & AWARDS

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<b>Microsoft Research PhD Fellowship</b> , Microsoft Corporation	2022-Present
<b>NRT FUTURE PhD Fellowship</b> , New York University, Center for Data Science	2020-Present

## PUBLICATIONS

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### PEER-REVIEWED CONFERENCE PUBLICATIONS:

- Bynum, L.E.J.**, Loftus, J.R., & Stoyanovich, J. (2023). **Counterfactuals for the Future**. *Proceedings of the AAAI Conference on Artificial Intelligence (AAAI 2023)*.
- Bell, A.; **Bynum, L.E.J.**; Drushchak, N.; Zakharchenko, T.; Rosenblatt, L.; & Stoyanovich, J. (2023). **The Possibility of Fairness: Revisiting the Impossibility Theorem in Practice**. *Proceedings of the 2023 ACM Conference on Fairness, Accountability, and Transparency (FAccT 2023)*.
- Bynum, L.E.J.**; Loftus, J.R.; and Stoyanovich, J. (2021). **Disaggregated Interventions to Reduce Inequality**. *Equity and Access in Algorithms, Mechanisms, and Optimization (EAAMO 2021)*.
- Bynum, L.E.J.**; Doster, T.; Emerson, T.H.; and Kvinge, H. **Rotational Equivariance for Object Classification Using xView**. *2020 IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2020)*. **Note:** alphabetical order.

### PEER-REVIEWED WORKSHOP PUBLICATIONS:

- Bynum, L.E.J.**; Arif Khan, F.; Konopatska, O.; Loftus, J.R.; and Stoyanovich, J. (2022). **An Interactive Introduction to Causal Inference**. VISxAI: Workshop on Visualization for AI Explainability (VISxAI 2022).

### UNDER REVIEW:

- Rosenblatt, L.; **Bynum, L.E.J.**; Bell, A.; and Stoyanovich, J. (2024). **A General Framework for Approximate Fairness**. Under Review. **Note:** equal contribution.
- Bynum, L.E.J.**; Loftus, J.R.; and Stoyanovich, J. (2024). **A New Paradigm for Counterfactual Reasoning in Fairness and Recourse**. Under Review.
- Loftus, J.R.; **Bynum, L.E.J.**; and Hansen, S. (2024). **Causal Dependence Plots**. Under Review.

## RESEARCH & WORK EXPERIENCE

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**Graduate Research Fellow**, Center for Responsible AI, New York University 2020-Present  
*Independent and collaborative research on causal inference, machine learning, and responsible AI (fairness, transparency, etc.)*

**Post-Baccalaureate Research Associate**, Pacific Northwest National Laboratory 2018-2020  
*Mathematical research across several government-sponsored projects in the Applied Statistics and Computational Modeling Group for the National Security Directorate of the US Department of Energy*

- Designed convex optimization solution for a waste-to-fuel bioconversion problem (hydrothermal liquefaction)
- Trained/tested convolutional neural networks (PyTorch) using PNNL's GPU and high performance computing clusters
- Built custom data visualization tools and dashboards (R Shiny, Jupyter) for internal and external clients

**Senior Thesis in Mathematics**, Advisor: Susan E. Martonosi, Harvey Mudd College 2017-2018  
*Developed custom clustering and regression techniques applicable to professional basketball data*

- Presented research at Harvey Mudd and SOCAMS 2018 Conference (at UCSB)
- Work used as the foundation for a Summer 2018 REU project at Harvey Mudd

**Software Engineering Intern**, Civis Analytics, Chicago, IL Summer 2017  
*Developed a Python library for statistical database matching across disparate data sources | 6-person team*

- Product used by Civis' data scientists and external clients to match and de-duplicate datasets

**Team Lead – Research in Industrial Projects for Students**, IPAM, UCLA Summer 2016  
*Led a team of students conducting industry-sponsored mathematical research for Advanced Micro Devices, Inc. | 4-person team*

- Studied the mathematics behind statistical power side-channel attacks and countermeasures against them
- Presented research at UCLA, Advanced Micro Devices, Inc. (AMD), and MAA Joint Math Meetings 2017 Conference

## TEACHING & MENTORING

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**Research Advisor**, R/AI Ukrainian Research Program, NYU + Ukrainian Catholic University 2022-Present  
*Advising undergraduate and master's students on independent research projects across responsible AI topics*

**Teaching Assistant / Section Leader — Responsible Data Science**, New York University Spring 2023  
*Taught lab sessions, held office hours, and graded homework assignments. Topics covered include algorithmic fairness, the data science life cycle, data protection, and algorithmic transparency/interpretability*

**Instructor — We Are AI**, New York University + Queens Public Library Spring 2022  
*Co-taught an AI education course to improve AI literacy in the general public, run in partnership with Queens Public Library*

**Operations Research Mathematics Grader**, Harvey Mudd College 2017-2018  
*Graded homework assignments covering linear programming, network optimization, and integer programming*

**Writing Center Consultant**, Harvey Mudd College 2015-2018  
*Provided one-on-one writing consultation with students from various disciplines to improve writing structure and technique*

**Academic Excellence Mathematics Tutor**, Harvey Mudd College 2016-2017  
*Recommended by department faculty to work with students to improve skills in Calculus, Differential Equations, Discrete Math, Linear Algebra, Multivariable Calculus, and Probability/Statistics*

**Student Mentor**, Harvey Mudd College 2016-2017  
*Served on the Residential Life team, mentoring first year students, hosting social events, facilitating new student orientation*

## SKILLS

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**Programming Languages:** (Fluent:) Python, R; (Familiar:) Java, C++, SQL, HTML/CSS, Javascript, Racket, Prolog

**Software and libraries:** Git, LaTeX, MATLAB, Numpy, Pandas, Pyro, PyTorch, etc.

**Spoken languages:** fluent English, intermediate French, basic Seychellois Creole