Matthew Eichhorn

Lecturer of Computer Science, Cornell University
meichhorn@cornell.edu
maeichho.github.io

Education

Cornell University August 2019 - August 2024
Ph.D., Applied Mathematics
Masters of Science (2022) GPA: 4.179
Dissertation: *Incentives, Causality, and Fairness: The Mathematics of Societal Decision-Making*

University at Buffalo, *The State University of New York* August 2015 - May 2019
Bachelors of Science, Mathematics and Computer Science GPA: 4.0
Honors College, Dean's List
Thesis: *Neural Networks for Plant Species Recognition in Street View Imagery*

Relevant Coursework
Algorithm (General, Online, Approximation), Market Design, Game Theory, Networks, Probability, Data Structures, Programming Languages, Abstract Algebra, Combinatorics, Numerical Analysis

Publications

- Cortez-Rodriguez, M., **Eichhorn, M.**, Yu C.L., "Exploiting neighborhood interference with low-order interactions under unit randomized design," Journal of Causal Inference 11.1 (2023): 20220051.
- Banerjee, S., **Eichhorn, M.**, and Kempe, D., "Allocating with Priorities and Quotas: Algorithms, Complexity, and Dynamics", In Proceedings of 24th ACM Conference on Economics and Computation (EC), 2023.
- **Eichhorn, M.**, Banerjee, S., and Kempe, D., "Online Team Formation Under Different Synergies", International Conference on Web and Internet Economics (WINE), 2022: 78-95.
- Cortez, M., **Eichhorn, M.**, and Yu, C.L., "Staggered rollout designs enable causal inference under interference without network knowledge", Advances in Neural Information Processing Systems (NeurIPS), 2022.
- Ringland, J., Bohm, M., Baek, S.R., and **Eichhorn, M.**, "Automated survey of selected common plant species in Thai homegardens using Google Street View imagery and a deep neural network", Earth Science Informatics (ESI), 2021: 179-191.
- Dao T., Sohoni N., Gu A., **Eichhorn, M.**, Blonder A., Leszczynski M., Rudra R., and Ré C., "Kaleidoscope: An Efficient, Learnable Representation For All Structured Linear Maps", In Proceedings of 8th International Conference on Learning Representations (ICLR), 2020
- Dao, T., Gu, A., **Eichhorn, M.**, Rudra, A., Ré, C., "Learning Fast Algorithms for Linear Transforms Using Butterfly Factorizations", In Proceedings of 36th International Conference on Machine Learning (ICML), 2019: 1517-1527.
- Karan, S., **Eichhorn, M.**, Hurlburt, B., Iraci, G. and Zola, J., "Fast Counting in Machine Learning Applications", In Proceedings of 34th Uncertainty in Artificial Intelligence (UAI), 2018: 540-549.

Conference Participation

Invited Talks:

- "Causal Inference under Low-Order Interference", *Symposium on Statistical Inference for Network Models*. Quebec City, Canada, June 2024.
- "Low-degree Outcomes and Clustered Designs: A Combined Approach for Causal Inference under Interference", *INFORMS Annual Meeting*. Phoenix, AZ, October 2023.
- "Online Allocation with Priorities and Quotas", *INFORMS Annual Meeting*. Phoenix, AZ, October 2023.
- "The Algorithmic Landscape of Priority-Respecting Allocations", *INFORMS Annual Meeting*. Indianapolis, IN, October 2022.
- "Simple yet Efficient Estimators for Network Causal Inference Even When the Network is Unknown", *American Causal Inference Conference* (ACIC). Berkeley, CA, May 2022.
- "Mind your Ps and Qs: Allocation with Priorities and Quotas", *Symposium on Foundations of Responsible Computing* (FORC). Cambridge, MA, June 2022.

Posters

- "Low-Order Outcomes and Clustered Designs: Combining Design and Analysis for Causal Inference under Interference", *American Causal Inference Conference* (ACIC). Seattle, WA, May 2024.
- "Clustered Rollout Designs for Causal Inference with Network Interference", *American Causal Inference Conference* (ACIC). Seattle, WA, May 2024.
- "To Treat or not to Treat, That is the Question", ORIE Young Researchers Workshop. Ithaca, NY, October 2023.
- "Exploiting Neighborhood Interference with Low Order Interactions under Unit Randomized Design", *American Causal Inference Conference* (ACIC). Austin, TX, May 2023.
- "Casual Inference with Neighborhood Interference and Low-Order Interactions", *NeurIPS 2022 Workshop on Causality for Real-world Impact*. New Orleans, LA, December 2022.

Teaching Experience

Cornell University

- *Co-Instructor*: CS 2110, Object-Oriented Programming and Data Structures — Spring 2025
- *Instructor*: CS 2000, Mathematical Foundations of Computing — Fall 2024
- *Instructor*: ENGRI 1101, Engineering Applications of Operations Research — Summer 2023
- *Co-Instructor*: CS 2800, Discrete Structures — Fall 2022, 2023
- *Co-Instructor*: CS 2111, Programming Practicum (Java) — Spring 2022
- *Teaching Assistant*: CS 4820, Introduction to Analysis of Algorithms — Spring 2020, 2021
- *Teaching Assistant*: MATH 1106, Calculus for the Life Sciences — Spring 2020, 2021

University at Buffalo

- *Teaching Assistant*: CSE 191, Discrete Structures — Fall 2017
- *Teaching Assistant*: CSE 250, Data Structures (C++) — Spring 2017, 2018
- *Teaching Assistant*: MTH 241, Calculus 3 — Spring 2017
- *Teaching Assistant*: MTH 141, Calculus 1 — Fall 2016

Service and Outreach

Computer Science Department, Cornell University Summer 2023

- Graduate student mentor for the *Bowers Undergraduate Research Experience* summer program

Center for Applied Math, Cornell University Fall 2022

- Field representative at *Consider Cornell* event; met with students from underrepresented backgrounds to discuss graduate school and review application materials

Math Department, Cornell University Fall 2021

- Developed/facilitated Graduate TA training on *TA Roles and Responsibilities* and *Professionalism*
- Organized and led a department workshop *Writing Good Questions* on effective assessment

Employment Experience

Cornell Active Learning in Mathematics, Cornell University Summers 2020-2022
Content Designer

- Developed active learning activities, assignments, and readings for an introductory calculus course.
- Created seven new workshops and projects for a linear algebra course through which students apply class concepts to problems from other disciplines.
- Developed a sequence of applied homework exercises to introduce relevant techniques from numerical analysis and algorithm design in an advanced linear algebra course.
- Visualize student survey data in R as part of the department's active learning initiative.

Computer Science Department, Cornell University Summers 2021, 2022
Course Developer

- Aided in the revision of the introductory discrete math course, including the writing of over 200 pages of course notes.
- Developed all materials for a new support course on discrete mathematics, including over 90 pages of notes and instructor guides and 100 exercises.
- Assisted in training the undergraduate facilitators for the course.

The Math Place, UB Undergraduate Learning Center August 2017 - May 2019
Math Tutor

- Tutor students in subjects ranging from algebra and trigonometry to calculus
- Develop study strategies and crafted practice problems to aid students in test preparation

Awards and Recognition

Community Leadership Award, Cornell Diversity Programs in Engineering Summer 2023
Graduate Teaching Award, Cornell Computer Science Department Fall 2021
Dean's Undergraduate Achievement Award, UB SEAS Spring 2019
Undergraduate Researcher Award, UB Computer Science Department Spring 2019
Dean's Outstanding Senior Award, UB College of Arts and Sciences Spring 2019
Harriet F. Montague Award, UB Math Department Fall 2018
Summer Math Scholarship, UB Math Department Summer 2018
Grace W. Capen Academic Award, University at Buffalo Spring 2017
Presidential Scholar, UB Honors College Class of 2019