Christopher Donnay

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EXPERIENCE

Data and Democracy Lab, Cornell University — Remote

Lab Manager — January 2025 - Present

- Manage a team of 6 contributors to "VoteKit", the Lab's Python package for modeling and analyzing elections, plan for the stable continuation of the package, and implement speed improvements and organizational refactorings.
- Manage the development of Districtr 2.0, a browser-based geospatial application for drawing legislative districts, with a remote team of 5 full-stack developers. Coordinate communication between the development team and the Lab PI. Brought on after two failed relaunch attempts and successfully brought to public release. Continue to facilitate the addition of new features and improve user experience.
- Design, write, and execute training experiences for collaborators and partner organizations, including a 3-day workshop in modeling alternative systems of elections, a 6-session program in statistical inference of polarized voting run by the Southern Poverty Law Center, and Python tutorials of the Lab's software.
- Organize and schedule Lab events, including a weekly Zoom seminar with 20+ academics, a 3-day in-person workshop with a budget of $40k that required coordinating travel, lodging, and catering for professors and non-profit staff, and tri-yearly in-person visits for full-time lab staff members that requires coordinating travel and lodging.
- Prepare and oversee the Lab's 2 million dollar budget, grant proposals, and funding relationships.
- Present research to community groups, partner organizations, and academics.

Research Scientist — January 2024 - January 2025

- Developed and maintained the codebase, as well as produced documentation, for the Lab's Python package "VoteKit", used for simulating and analyzing elections. Was the number one contributor on GitHub with over 450 commits.
- Conducted computational research on the Voting Rights Act, polarized voting, election modeling, and historical elections using a high-performance cluster. Results were used to inform the efforts of political advocacy groups in 3 states and were incorporated into a research paper.
- Communicated and presented modeling results to community groups, academics, non-profits, and technical stakeholders.

STEM Teacher — Bryn Mawr, PA

The Shipley School, Penn GSE Teaching Fellow — June 2018 - June 2020

- Created a novel, year-long curriculum and accompanying materials for an introduction to Python course.
- Taught computer science courses in Python and Processing, as well as geometry.
- Conducted inquiry-based research to inform teaching practice and pedagogy for my Master's degree.

EDUCATION

Department of Mathematics, The Ohio State University — Columbus, OH

Doctor of Philosophy in Mathematics — December 2024

- **Advisor**: Matthew Kahle
- **Co-advisor**: Moon Duchin
- **Research**: Mathematics of Democracy
- **Data Science Certificate**: Erdős Institute

Department of Mathematics, The Ohio State University — Columbus, OH

Master of Science in Mathematics — May 2024

University of Pennsylvania Graduate School of Education — Philadelphia, PA

Master of Science in Education — May 2020

Pomona College — Claremont, CA

Bachelor of Arts, Mathematics, Cum Laude — May 2018

Courses Taught

- **Math 1125; Mathematics for Elementary Teachers I**: The Ohio State University, Fall 2022.

- **Math 1075; Precollege Algebra**: The Ohio State University, Fall 2021.

- **Introduction to Animation in Processing**: The Shipley School, 2019-2020.

- **Geometry**: The Shipley School, 2018-2020.

- **Introduction to Computer Science in Python**: The Shipley School, 2018-2020.

Presentations

- **Portland, OR 2024 City Council Election Analysis**: North Star Civic Foundation, July 2025.

- **Portland, OR 2024 City Council Election Analysis**: Oregon Donor Alliance, April 2025.

- **Portland, OR 2024 City Council Election Analysis**: Lift Every Voice Portland convening, More Equitable Democracy, April 2025.

- **Portland, OR 2024 City Council Election Analysis**: Ranked-choice Voting Research and Communications Squad, March 2025.

- **Asymptotics of Redistricting the $n \times n$ grid**: MGGG seminar, October 2024.

- **Asymptotics of Redistricting the $n \times n$ grid**: Combinatorics seminar, The Ohio State University, October 2024.

- **3:1 Nesting Rules in Redistricting**: Computational redistricting, SIAM Annual Meeting, July 2024.

- **Asymptotics of Redistricting the $n \times n$ grid**: Redistricting Seminar, SLMath, December 2023.

- **Understanding Nesting Rules in Redistricting**: Graduate Student Topology and Geometry Seminar, The Ohio State University, February 2023.

- **High-Throughput Screening of Nanoporous Materials with Topological Data Analysis**: Graduate Student Topology and Geometry Seminar, The Ohio State University, April 2022.

Publications

- **"Asymptotics of Redistricting the $n \times n$ grid"**: with M. Kahle, to appear in *The American Mathematical Monthly,* November 2025.

- **"VoteKit: A Python package for computational social choice research"**: with M. Duchin, J. Gibson, Z. Glaser, A. Hong, M. Mukundan, and J. Wang, *Journal of Open Source Software*, May 2025.

- **"3:1 Nesting Rules in Redistricting"**: in revisions with *Statistics and Public Policy.*

- **"Proportionality for Ranked Voting, in Theory and Practice"**: with G. Benadè, M. Duchin, and T. Weighill, preprint.

- **"p-adic Quotient Sets II: Quadratic Forms"**: with S. Garcia and J. Rouse, *Journal of Number Theory*, August 2019.

Fellowships

- **Dissertation Fellowship**: The Ohio State University, Fall 2024.

- **Algorithms, Fairness, and Equity**: Program member, SLMath, Fall 2023.

- **Rhodus Graduate Fellowship**: Department of Mathematics, The Ohio State University, Fall 2023.

- **Data Science for Democracy**: SNF Agora Institute, Johns Hopkins University, June 2022.

- **Tibor Radó Research Semester**: The Ohio State University, Spring 2022.

- **Distinguished University Fellowship**: The Ohio State University, 2020-2021.

Awards

- **Distinguished First-Year Graduate TA**: Department of Mathematics, The Ohio State University, April 2022.

- **1st Place Data Science Bootcamp**: Erdős Institute, The Ohio State University, December 2020.

- **Bruce Jay Levy Prize in Mathematics**: Mathematics Department, Pomona College, 2017.

Workshops

- **Voting Methods Modeling Workshop**: Organizer, Data and Democracy Lab, Cornell University, June 2025.

- **Randomness in Topology and its Applications**: Attendee, IMSI, University of Chicago, March 2023.

Service

- **President**: Math Graduate Student Association, The Ohio State University, October 2022-December 2024.

- **Member**: Committee for Graduate Student Mental Health, Department of Mathematics, The Ohio State University, February 2023-December 2024.

- **Panelist**: STEM Graduate Student Panel for Humanitarian Engineering Scholars, The Ohio State University, February 2023.

- **Panelist**: Association for Women in Mathematics Graduate School Panel, The Ohio State University, November 2021.

- **Panelist**: Graduate School Panel, Pomona College, September 2020.

Skills and Background

- **Python**: Jupyter, (Geo)Pandas, Poetry, NetworkX, NumPy, scikit-learn, UV.

- **GitHub**

- **Mathematics**: Markov Chain Monte Carlo methods, graphs and networks, topological data analysis, asymptotic analysis, computational social choice, voting methods.

- **Open Source Project Management**

- **High-performance clusters**: SLURM

- **Other software**: QGIS, Mathematica, LaTeX,

- **Selected Courses**: Computational Statistics, Fundamentals of Computer Science, Operations Research.