

# Philip S. Chodrow

Assistant Professor of Computer Science  
Middlebury College

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## Experience

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Assistant Professor of Computer Science

MIDDLEBURY COLLEGE

2022 – present

Middlebury, VT

Hedrick Visiting Assistant Adjunct Professor of Mathematics

UNIVERSITY OF CALIFORNIA, LOS ANGELES

2020 – 2022

Los Angeles, CA

## Education

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PhD in Operations Research

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

2015-2020

Cambridge, MA

BA in Mathematics and Philosophy

SWARTHMORE COLLEGE

2008-2012

Swarthmore, PA

## Grants, Fellowships and Funding

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RUI: Network Evolution with Unobserved Mechanisms (\$287,522)

NATIONAL SCIENCE FOUNDATION (NSF)

2024-2027

Middlebury, VT

Graduate Research Fellowship (\$138,000)

NATIONAL SCIENCE FOUNDATION (NSF)

2017-2020

Cambridge, MA

Fulbright Research Award (~\$28,000)

US-NORWAY FULBRIGHT FOUNDATION

2012-2013

Oslo, Norway

## Papers

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### Peer Reviewed

14. Heather Z. Brooks, **PSC** and Mason A. Porter (2024): Emergence of Polarization in a Sigmoidal Bounded-Confidence Model of Opinion Dynamics. *SIAM Journal on Applied Dynamical Systems* 23, 1442–1470.
13. Jürgen Kritschgau, Daniel Kaiser, Oliver Alvarado Rodriguez, Ilya Amburg, Jessalyn Bolkema, Thomas Grubb, Fangfei Lan, Sepideh Maleki, **PSC** and Bill Kay (2024): Community Detection in Hypergraphs via Mutual Information Maximization. *Scientific Reports* 14, 6933–6934.
12. Quindel Jones, Andrés R. Vindas-Meléndez, Ariana Mendible, Manuchehr Aminian, Heather Z. Brooks, Nathan Alexander, Carrie Diaz Eaton and **PSC** (2023): Data Science and Social Justice in the Mathematics Community. *Notices of the American Mathematical Society* 70, 1–2.

11. **PSC**, Nicole Eikmeier and Jamie L. Haddock (2023): Nonbacktracking Spectral Clustering of Nonuniform Hypergraphs. *SIAM Journal on Mathematics of Data Science* 5, 251–279.
10. Mary Angelique G. Demetillo, Colin Harkins, Brian C. McDonald, **PSC**, Kang Sun and Sally E. Pusede (2021): Space-based Observational Constraints on NO<sub>2</sub> Air Pollution Inequality from Diesel Traffic in Major US Cities. *Geophysical Research Letters* 48, e2021GL094333.
9. **PSC**, Nate Veldt and Austin R. Benson (2021): Generative Hypergraph Clustering: From Blockmodels to Modularity. *Science Advances* 7, eabh1303.
8. Mari Kawakatsu, **PSC**, Nicole Eikmeier and Daniel B. Larremore (2021): Emergence of Hierarchy in Networked Endorsement Dynamics. *Proceedings of the National Academy of Sciences* 118, e2015188118. (three equal first authors)
7. **PSC** (2020): Configuration Models of Random Hypergraphs. *Journal of Complex Networks* 8, cnaa18.
6. **PSC** (2020): Moments of Uniform Random Multigraphs with Fixed Degree Sequences. *SIAM Journal on Mathematics of Data Science* 2, 1034–1065.
5. **PSC** and Peter J. Mucha (2020): Local Symmetry and Global Structure in Adaptive Voter Models. *SIAM Journal on Applied Mathematics* 80, 620–638.
4. **PSC** and Andrew Mellor (2020): Annotated Hypergraphs: Models and Applications. *Applied Network Science* 5, 9–10.
3. **PSC** (2017): Structure and Information in Spatial Segregation. *Proceedings of the National Academy of Sciences* 114, 11591–11596.
2. **PSC**, Zeyad Al-Awwad, Shan Jiang and Marta C. González (2016): Demand and Congestion in Multiplex Transportation Networks. *PloS ONE* 11, e161738.
1. **PSC**, Cole Franks and Brian Lins (2013): Upper and Lower Bounds for the Iterates of Order-Preserving Homogeneous Maps on Cones. *Linear Algebra and its Applications* 439, 999–1005.

## Working Papers

4. **PSC**, Heather Z. Brooks, Harlin Lee, Anna Haensch, Juan G. Restrepo and Mason A. Porter: Dynamics of Female Gender Representation in Academic Mathematics. *In progress*.
3. Yifei Luo\*, Nicholas W. Landry and **PSC**: Efficient Sampling of Configuration-Model Hypergraphs. *In progress*. (\*Undergraduate mentee)
2. Xie He, **PSC** and Peter J. Mucha: Edge-Related Growing Hypergraphs. *In progress*.
1. William Thompson, Moyi Tian, Thomas Gebhart, Linh Huynh, Alexander Wiedemann, Vicki Modisette, **PSC** and Heather Z. Brooks: Inferring Interaction Kernels from Stochastic Opinion Dynamics on Networks. *In progress*.

## Other Writings

2. **PSC**, Manuchehr Aminian, Carlos Paniagua and Jude Higdon (2021): Persons Charged with Violations of 21 U.S.C. §846: Poverty, Unemployment, Education, and Sentences.
1. **PSC**, Mari Kawakatsu, Nicole Eikmeier and Daniel B. Larremore (2021): Networks, Dynamics, and Prestige: How Hierarchies Emerge from Individual Choices. *SIAM News Blog*.

## Invited Talks

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### Dynamics of Gender Representation in Professional Mathematics

2024 Tufts University Applied Mathematics Seminar

### Connection, Computation, and Complex Systems in Undergraduate Education

2024 Conference on Network Science (NetSci)

### Edge-Related Growing Hypergraphs

2024 BRAINS Seminar: Bridging AI, Networks and Hypergraphs

### Challenges and Opportunities in Hypergraph Network Data Science

2023 Vermont-KIAS Workshop on Group Interactions in Network Science

2023 Joint Math Meetings: Special Session on Hypergraph Data Science

### Feedback Loops from Ranking in Networks

2023 Smith College Mathematics Seminar

2021 REU on Kaczmarz Methods for Large-Scale Data Analysis, Claremont Colleges

2021 UCLA Undergraduate Mathematics Student Association

### Eigenvector Methods for Clustering Nonuniform Hypergraphs

2024 Toronto Metropolitan University Network Science Seminar

2023 University of Vermont Joint Lab Seminar

2022 Oxford University Networks Seminar

2022 Swarthmore College Mathematics Seminar

2021 Canadian Mathematical Society Winter Meeting

2021 UCLA Undergraduate Mathematics Student Association

2021 Claremont Center for the Mathematical Sciences

### Generative Hypergraph Clustering: Scalable Hueristics and Sparse Thresholds

2023 University of Edinburgh Informatics Seminar

2023 University of Glasgow Computer Science Seminar

2022 Middlebury College Computer Science Seminar

2022 Colgate University Computer Science Seminar

2022 Wesleyan University Computer Science Seminar

2021 Grinnell College Computer Science Seminar

2021 Conference on Network Science (NetSci): Satellite on Higher-Order Models in Network Science

2021 Association for the Advancement of Artificial Intelligence (AAAI): Workshop on Graphs and Complex Structures for Learning and Reasoning

### Random Graphs for Data Science

2020 UCLA Network Science Seminar

2020 MIT ORC Student Seminar

2019 Northeastern University Network Science Seminar

### Public Talks: Data Science and AI

2023 Middlebury DLINQ Summer Workshop

2023 Middlebury TEDx

2023 Middlebury Faculty At Home

## Other Professional Events

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### Invited Panels

- 2022 Panel on Academic Job Interviews  
*Pomona REU*
- 2022 Data Science and the Social Sciences  
*UCLA Data Science Union*
- 2021 Early-Career Research Panel  
*Northeastern Regional Conference on Complex Systems*
- 2021 Perspectives on Graphs and Complex Structures for Learning and Reasoning  
*AAAI*

### Workshop Participation

- 2023 Data Science and Social Justice: Networks, Policy, and Education  
*ICERM*
- 2023 AMS Mathematics Research Community: Mathematics of Complex Social Systems
- 2022 Data Science and Social Justice: Networks, Policy, and Education  
*ICERM*
- 2022 AMS Mathematics Research Community: Models and Methods for Sparse (Hyper)Network Science

## Honors and Awards

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Liggett Instructor Distinguished Faculty Teaching Award

2022

DEPARTMENT OF MATHEMATICS, UCLA

Los Angeles, CA

*"Recognizing excellence in contribution to the instructional mission of the Department."*

Ivy Award

2012

SWARTHMORE COLLEGE

Swarthmore, PA

*"Recognizing the man of the graduating class who is outstanding in leadership, scholarship, and contributions to the Swarthmore College community."*

## Travel and Conference Awards

- 2022 SIAM Travel Award, *SIAM Conference on Mathematics of Data Science*
- 2021 SIAM Travel Award, *SIAM Conference on Applications of Dynamical Systems*
- 2020 Best Poster Award, *Northeastern Regional Conference on Complex Systems*

## Teaching

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### Middlebury College

Spring 2025 CSCI 0451: *Machine Learning*  
CSCI 0442: *Network Science*

Winter 2025 CSCI 0702: *Senior Thesis*

Fall 2024 CSCI 0200: *Mathematical Foundations of Computing (x2)*

CSCI 0702: *Senior Thesis*  
 CSCI 0500: *Advanced Study*  
 Spring 2024 CSCI 0451: *Machine Learning*  
 CSCI 0702: *Senior Thesis*  
 Winter 2024 CSCI 0702: *Senior Thesis*  
 Fall 2023 CSCI 0200: *Mathematical Foundations of Computing* (x2)  
 Spring 2023 CSCI 0451: *Machine Learning* (x2)  
 Fall 2022 CSCI 0145: *Introduction to Computing* (x2)

## University of California, Los Angeles

Spring 2022 MATH 168: *Introduction to Networks*  
 Winter 2022 PIC 16B: *Python Programming with Applications II*  
 Fall 2021 PIC 16B: *Python Programming with Applications II*  
 PIC 16A: *Python Programming with Applications I*  
 Spring 2021 PIC 16B: *Python Programming with Applications II*  
 PIC 16A: *Python Programming with Applications I*  
 Winter 2021 PIC 16A: *Python Programming with Applications I*  
 Fall 2020 PIC 16A: *Python Programming with Applications I*

## Thesis and Research Students

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### Thesis Advisees

2025	Violet Ross	<i>Growing Hypergraphs with Node Attributes</i>
2024	Bell Luo	<i>Efficient Sampling from Hypergraph Configuration Models</i>
	Jamie Hackney	<i>Opinion Dynamics and Electoral Systems</i>

### Thesis Committees

2025	Alex Takoudes	( <i>Earth and Climate Science</i> )
	Liam Patty	( <i>Computer Science</i> )
	Alexis Ballo	( <i>Computer Science</i> )
2024	Toby Pouler	( <i>Computer Science</i> )
	Otis Milliken	( <i>Computer Science</i> )
2023	Ben Rahill	( <i>Computer Science</i> )

### Other Research Students

2024	Justin Corke	<i>Degree Assortativity of Union Hypergraphs</i>
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## Professional Development

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2024 – present	Cultural Competency in Computing (3C) Fellowship
2023	Middlebury College Engaged Listening Project
2021	MAA Project NeXT
2020	UCLA CEILS Introduction to Evidence-Based Pedagogy

## Professional Service

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### Journal Reviews

<i>SIAM Review</i>	<i>SIAM J. Math. Data Sci.</i>	<i>SIAM J. Appl. Dyn. Sys.</i>
<i>SIAM J. Matrix Analysis</i>	<i>Nature Communications</i>	<i>Science Advances</i>
<i>Proc. Nat. Acad. Sci. (PNAS)</i>	<i>J. Applied and Computational Topology</i>	<i>Physical Review Letters</i>
<i>Physical Review X</i>	<i>Physical Review E</i>	<i>IEEE Trans. Network Sci. and Eng.</i>
<i>Nature Human Behavior</i>	<i>Social Network Analysis and Mining</i>	<i>Networks and Spatial Economics</i>
<i>Chaos</i>	<i>Int'l J. Geo. Info. Sys.</i>	<i>PLoS One</i>

### Events Co-Organized

Minisymposium on Tensor Methods in Network Science	2022
SIAM CONFERENCE ON MATHEMATICS OF DATA SCIENCE	San Diego, CA
Southern California Applied Mathematics Symposium (SoCAMS)	2022
HARVEY MUDD COLLEGE	Claremont, CA
MAA Project NExT Workshop on Projects Across the Mathematics Curriculum	2022
JOINT MATH MEETINGS	Online
Workshop on Graphs and Complex Structures for Learning and Reasoning	2022
ASSOCIATION FOR THE ADVANCEMENT OF ARTIFICIAL INTELLIGENCE (AAAI)	Vancouver, CA

### Professional Societies

Society for Industrial and Applied Mathematics (SIAM)	Mathematical Association of America (MAA)
Association for Women in Mathematics (AWM)	National Association of Mathematicians (NAM)

## Institutional Service

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### Committee Membership

Ad Hoc Committee on Curricular Requirements	2024-
MIDDLEBURY COLLEGE	Middlebury, VT
Steering Committee of Midd.Data	2023-
MIDDLEBURY COLLEGE	Middlebury, VT