

Dr. Philip S. Chodrow

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Academic Positions

Assistant Professor

DEPARTMENT OF COMPUTER SCIENCE, MIDDLEBURY COLLEGE

Middlebury, VT

2022–

Hedrick Visiting Assistant Adjunct Professor

DEPARTMENT OF MATHEMATICS, UNIVERSITY OF CALIFORNIA, LOS ANGELES

Los Angeles, CA

2020–2022

Education

PhD in Operations Research

MASSACHUSETTS INSTITUTE OF TECHNOLOGY (MIT)

Cambridge, MA

2015–2020

B. A. with High Honors in Mathematics and Philosophy, ΦBK

SWARTHMORE COLLEGE

Swarthmore, PA

2008–2012

Papers

PEER-REVIEWED PUBLICATIONS

10. M. A. Demetillo, C. Harkins, B. McDonald, **PSC**, K. Sun, and S. Pusede (2021). Space-based observational constraints on NO₂ air pollution inequality from diesel traffic in major U.S. cities. *Geophysics Review Letters*, 48(17):e2021GL094333
9. **PSC**, N. Veldt, and A. R. Benson (2021). Generative hypergraph clustering: From blockmodels to modularity. *Science Advances*, 7:eabh1303
8. M. Kawakatsu*, **PSC***, N. Eikmeier*, and D. B. Larremore (2021). Emergence of hierarchy in networked endorsement dynamics. *Proceedings of the National Academy of Sciences*, 118(16):e2015188118 (*equal first authors)
 - Commentary: S. DeDeo and E. A. Hobson (2021). From equality to hierarchy. *Proceedings of the National Academy of Sciences*, 118(21):e2106186118
7. **PSC** (2020). Moments of uniformly random multigraphs with fixed degree sequences. *SIAM Journal on Mathematics of Data Science*, 2(4):1034–1065
6. **PSC** (2020). Configuration models of random hypergraphs. *Journal of Complex Networks*, 8(3):cnaa018
5. **PSC** and P. J. Mucha (2020). Local symmetry and global structure in adaptive voter models. *SIAM Journal on Applied Mathematics*, 80(1):620–638
4. **PSC** and A. Mellor (2020). Annotated hypergraphs: Models and applications. *Applied Network Science*, 5(9)
3. **PSC** (2017). Structure and information in spatial segregation. *Proceedings of the National Academy of Sciences*, 114(44):11591–11596
2. **PSC**, Z. Al-Awwad, S. Jiang, and M. C. González (2016). Demand and congestion in multiplex transportation networks. *PLoS ONE*, 11(9):e0161738

1. **PSC**, C. Franks, and B. Lins (2013). Upper and lower bounds for the iterates of order-preserving homogeneous maps on cones. *Linear Algebra and its Applications*, 439(4):999–1005

WORKING PAPERS

- Q. Jones, A. R. Vindas Meléndez, A. Mendible, H. Z. Brooks, M. Aminian, N. Alexander, C. Diaz-Eaton, and **PSC** (2022). Data science and social justice in the mathematics community. *In preparation*
- **PSC**, N. Eikmeier, and J. Haddock (2022). Nonbacktracking spectral clustering of nonuniform hypergraphs. *arXiv:2204.13586*
- **PSC***, K. Finn*, and M. A. Porter (2022). Model-based approaches to layer aggregation in animal dominance networks. *In preparation*. (*equal first authors)
- H. Z. Brooks, **PSC**, and M. A. Porter (2022). Smooth approximations for bounded confidence models. *In preparation*.
- A. C. Schwarze, **PSC**, and M. A. Porter (2019). Log-minor distributions and an application to estimating mean subsystem entropy. *arXiv: 1901.09456*

OTHER WRITINGS

- **PSC**, M. Aminian, C. Paniagua, and J. Higdon (2021). Persons charged with violations of 21 U.S.C. §846: Poverty, unemployment, education, and sentences. Technical report, Institute for the Quantitative Study of Inclusion, Diversity, and Equity (QSIDE) *Part of amicus brief in Rodriguez-Rivera v. United States, U.S. Supreme Court case 21-143*
- **PSC**, M. Kawakatsu, N. Eikmeier, and D. B. Larremore (2021). Networks, dynamics, and prestige: How hierarchies emerge from individual choices. *SIAM News Blog*

Awards & Grants

Liggett Instructor Distinguished Faculty Teaching Award Los Angeles, CA
 DEPARTMENT OF MATHEMATICS, UCLA 2022
 Recognizing excellence in contribution to the instructional mission of the Department.

NSF Graduate Research Fellowship (GRFP) Cambridge, USA
 NATIONAL SCIENCE FOUNDATION 2017–2020

Goodwin Teaching Award Nominee Cambridge, USA
 MIT OPERATIONS RESEARCH CENTER 2018
 Recognizing a graduate teaching assistant who displays “*conspicuously effective teaching*”

Research Fellow, Center for the Study of Mind and Nature Oslo, Norway
 U.S.–NORWAY FULBRIGHT PROGRAM 2012–2013

Ivy Award Swarthmore, USA
 SWARTHMORE COLLEGE 2012
 “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 San Diego, CA
- 2021 **SIAM Travel Award**, SIAM Conference on Applications of Dynamical Systems
- 2020 **Best Poster Award**, Northeastern Regional Conference on Complex Systems

Talks, Presentations, & Events

INVITED CONFERENCE TALKS

- 2022 **Topology and Stability in Smoothly Nonlinear Opinion Dynamics** *Online*
AMS Eastern Sectional Meeting. *Special Session on Structured Populations*
- 2021 **Eigenvector Methods for Clustering Nonuniform Hypergraphs** *Online*
Canadian Mathematical Society Winter Meeting. *Session on Graph Theory and its Applications*
- 2021 **Generative Community Detection in Hypergraphs** *Online*
Networks 2021. *Satellite on Higher-Order Models in Network Science*
- 2021 **Emergence of Hierarchy in Networked Endorsement Dynamics** *Online*
SIAM Conference on Applications of Dynamical Systems: *Minisymposium on Mathematics of Inequity and Inequality*
- 2021 **Generative Hypergraph Clustering: from Blockmodels to Modularity** *Online*
Association for the Advancement of Artificial Intelligence (AAAI): *Workshop on Graphs and Complex Structures for Learning and Reasoning* (online)
- 2020 **Local Techniques in Adaptive Voter Models** *Medford, MA*
AMS Eastern Sectional Meeting, Tufts University
- 2019 **The Structure of Spatial Segregation** *Singapore*
Conference on Complex Systems
- 2019 **Divergence, Entropy, Information** *Burlington, VT*
Society of Young Network Scientists

INVITED SEMINARS AND COLLOQUIA

- 2022 **Generative Hypergraph Clustering: Scalable Heuristics and Sparse Thresholds** *Middlebury, VT*
Middlebury College Department of Computer Science
- 2022 **Generative Hypergraph Clustering: Scalable Heuristics and Sparse Thresholds** *Hamilton, NY*
Colgate University Department of Computer Science
- 2022 **Eigenvector Methods for Clustering Nonuniform Hypergraphs** *Swarthmore, PA*
Swarthmore College Department of Mathematics and Statistics
- 2022 **Generative Hypergraph Clustering: Scalable Heuristics and Sparse Thresholds** *Middletown, CT*
Wesleyan University Department of Mathematics and Computer Science
- 2021 **Eigenvector Methods for Clustering Nonuniform Hypergraphs** *Los Angeles, CA*
UCLA Undergraduate Mathematics Students' Association (online)
- 2021 **Generative Hypergraph Clustering: Scalable Heuristics and Sparse Thresholds** *Grinnell, IA*
Grinnell College Department of Computer Science
- 2021 **Eigenvector Methods for Clustering Nonuniform Hypergraphs** *Claremont, CA*
Claremont Center for the Mathematical Sciences
- 2021 **Feedback Loops from Ranking in Networks** *Claremont, CA*
REU on Kaczmarz Methods for Large-Scale Data Analysis (online)
- 2021 **Feedback Loops from Ranking in Networks** *Los Angeles, CA*
UCLA, Undergraduate Mathematics Students' Association (online)
- 2020 **Random Graphs for Data Science** *Los Angeles, CA*
Porter Lab, UCLA Department of Mathematics (online)

- 2020 **Moments of Uniformly Random Multigraphs** *Cambridge, MA*
MIT, ORC Student Seminar
- 2019 **Configuration Models of Random Hypergraphs** *Boston, MA*
Northeastern University, Network Science Institute
- 2018 **What's the Fuss About Power Laws?** *Cambridge, MA*
MIT, ORC Student Seminar
- 2017 **The Structure of Spatial Segregation** *Cambridge, MA*
Harvard University, Growth Lab

INVITED PANELS

- 2022 **Panel on Academic Job Interviews** *Pomona College*
Pomona Research in Mathematics Experience
- 2022 **Data Science and the Social Sciences** *UCLA*
UCLA Data Science Union
- 2021 **Educational Panel For Early-Stage Researchers** *Online*
Northeastern Regional Conference on Complex Systems
- 2021 **Perspectives on Graphs and Complex Structures for Learning and Reasoning** *Online*
AAAI. *Workshop on Graphs and Complex Structures for Learning and Reasoning*

WORKSHOP PARTICIPATION

- 2022 **Data Science and Social Justice: Networks, Policy, and Education (Invited)** *Providence, RI*
Institute for Computational and Experimental Research in Mathematics (ICERM)
- 2022 **Mathematics Research Community: Models and Methods for Sparse (Hyper)Network Science** *Java Center, NY*
American Mathematical Society

CONTRIBUTED TALKS

- 2022 SIAM Conference on Mathematics of Data Science *San Diego, CA*
- 2022 SIAM Workshop on Network Science *Online*
- 2021 Networks 2021, Parallel Session on Configuration Model Random Graphs *Online*
- 2021 Networks 2021, Satellite on Statistical Inference in Network Models *Online*
- 2020 SIAM Workshop on Network Science (SIAM NS) *Online*
- 2020 Northeastern Regional Conference on Complex Systems (NERCCS) *Online*
- 2019 Graduate Research Symposium, Northeastern Network Science Institute *Boston, MA*
- 2019 Conference on Network Science (NetSci) *Burlington, VT*
- 2019 SIAM Workshop on Network Science (SIAM NS) *Snowbird, UT*
- 2019 Conference on Complex Systems (CCS) *Singapore*
- 2018 SIAM Workshop on Network Science (SIAM NS) *Portland, OR*
- 2018 International Conference on Complex Systems (ICCS) *Cambridge, MA*
- 2018 Conference on Complex Networks (CompleNet) *Boston, MA*
- 2017 Conference on Network Science (NetSci) *Indianapolis, IN*
- 2016 Conference on Complex Systems (CCS) *Amsterdam, ND*

CONTRIBUTED POSTERS

- 2020 Northeastern Regional Conference on Complex Systems *SUNY Buffalo*

Teaching

MATH 168: Introduction to Networks

UCLA Dept. of Mathematics

INSTRUCTOR

Spring 2022

An upper-division course on the mathematics of networked systems, covering graph measures, random graphs, analysis techniques for relational data, and dynamics on networks.

PIC 16B: Python Programming with Applications II

UCLA Dept. of Mathematics

INSTRUCTOR

2021–

A project-based course in advanced computational science using the Python programming language, including linear algebra and optimization, network science, machine learning, and data visualization. Original syllabus and design. Delivered remotely in Spring '21 and in person starting Fall '21. Assessed using specifications grading starting in Fall '21.

PIC 16A: Python Programming with Applications I

UCLA Dept. of Mathematics

INSTRUCTOR AND COURSE COORDINATOR

2020–

A flipped and project-based introduction to Python programming, with an emphasis on scientific computing, data analysis, and machine learning. Delivered both remotely in academic year '20-'21 and in-person starting Fall '21. Original syllabus and design. Adopted by other instructors. Delivered to over 400 students in '20-'21. Planned delivery to over 500 students in '21-'22.

Computing in Optimization and Statistics

MIT ORC

ORGANIZER AND INSTRUCTOR

2015–2020

A PhD-level seminar led by graduate students in principles and tools for computational data science and analytics.

Software Tools for Data Science

MIT ORC

ORGANIZER AND INSTRUCTOR

2017–2020

A sequence in computational tools for data science, offered to new students in the Masters of Business Analytics program at MIT. Original syllabus and design.

6.268, Network Science and Models

MIT Dept. of EECS

HEAD TEACHING ASSISTANT

2018

Responsibilities including exam-writing, grading, management of TAs, active-learning tutorial sections, project mentorship, and project evaluations.

6.431, Introduction to Probability

MIT Dept. of EECS

TEACHING ASSISTANT

2017

Responsibilities including active-learning tutorial sections, office hours, and exam grading.

Mentorship of Undergraduate Research

Ben Brill

UCLA Dept. of Mathematics

STATISTICS AND COGNITIVE SCIENCE, UCLA '23

Summer 2021

“Analyzing Gender Equity in Mathematical Subject Classifications.” Jointly mentored with Mason Porter.

Hinal Jajal

UCLA Dept. of Mathematics

APPLIED MATHEMATICS, UCLA '23

2021-2022

“Racial Disparities in Criminal Sentencing in Virginia State Courts.”

Professional Development

Project NExT Fellow

GOLD '21 COHORT

Professional development for early career mathematicians focused on innovative pedagogy, student engagement, teacher-scholarship, and equity in the mathematics community.

MAA

2021–2022

Introduction to Evidence-Based Pedagogy

PARTICIPANT

Participant in a course taught through UCLA's Center for Education Innovation and Learning in the Sciences (CEILS) and the national Center for the Integration of Research, Teaching, and Learning (CIRTL) on the principles of evidence-based pedagogy and course design. Topics included active learning, backwards design, and classroom equity.

UCLA CEILS

2020

Journal Service

GUEST EDITOR

2022 **Journal of Physics: Complexity**

Focus Issue on Learning and Reasoning in Generalized Graphs

REVIEWER

SIAM Review

SIAM J. Math. Data Sci.

Nature Communications

Proc. Nat. Acad. Sci. (PNAS)

J. Applied and Computational Topology

Physical Review Letters

Physical Review X

Physical Review E

IEEE Trans. Network Sci. and Eng.

Nature Human Behavior

Social Network Analysis and Mining

Networks and Spatial Economics

Chaos

Int'l J. Geo. Info. Sys.

PLoS One

Chaos, Solitons, and Fractals

Other Professional Service

EVENTS CO-ORGANIZED

2022 **Southern California Applied Mathematics Symposium**

Harvey Mudd College

Claremont, CA

2022 **Workshop on Graphs and Complex Structures for Learning and Reasoning**

Association for the Advancement of Artificial Intelligence (AAAI)

Vancouver, CA

2022 **MAA Project NExT Session: Projects Across the Mathematics Curriculum**

Joint Math Meetings

(Online)

2018 **Seminar: Operations Research for Social Good**

Massachusetts Institute of Technology

Cambridge, MA

PROGRAM COMMITTEES

2022 Northeast Regional Conference on Complex Systems

Buffalo, NY

2020 Conference on Complex Systems

Online

2018 Conference on Complex Systems

Thessaloniki, GR

DEPARTMENTAL SERVICE

Member, Committee on Teaching

DEPARTMENT OF MATHEMATICS

UCLA

2021–

OUTREACH AND ENGAGEMENT

SIAM Conference on Mathematics of Data Science

GUIDED AFFINITY GROUP LEADER: BROADER ENGAGEMENT PROGRAM

San Diego, CA

2022

Institute for the Quantitative Study of Inclusion, Diversity, and Equity

PARTNER AND AFFILIATE DATA SCIENTIST

2020–

My work at QSIDE involves both (a) scientific and technical contributions to equity-driven data projects and (b) mentorship of undergraduate students who are engaged in those projects.

Skype a Scientist

VOLUNTEER SCIENTIST

2020–

Remote meetings with children and adults to discuss science and the life of a scientist. Recent meetings include guiding elementary school students through the computation of eigenvector centrality in social networks and advising an adult theater troupe for an original podcast related to machine learning and artificial intelligence.

GRANT REVIEWS

2022 **Member, Review Panel in Mathematics**

National Science Foundation (NSF)

Online

Professional Societies

Society for Industrial & Applied Mathematics
Mathematical Association of America

Association for Women in Mathematics
National Association of Mathematicians

Software

RESEARCH

2020 Configuration Models of Random Hypergraphs

[\(Link\)](#)

2020 Annotated Hypergraphs

[\(Link\)](#)

2020 Moments of Uniformly Random Multigraphs

[\(Link\)](#)

PEDAGOGICAL

2021 PIC16B Course Website

[\(Link\)](#)

2020 PIC16A Course Website

[\(Link\)](#)

2018 Computing in Optimization and Statistics

[\(Link\)](#)

2017 Computing in Optimization and Statistics

[\(Link\)](#)

2020 Statistical Programming for Business Analytics

[\(Link\)](#)

Other Experience

Data Analyst

HEALTH LEADS

Boston, USA

2013–2015

Research Assistant
LABORATORY FOR QUANTITATIVE MEDICINE

Cambridge, USA
2012–2014

Visiting Researcher
CENTER FOR THE STUDY OF MIND IN NATURE

Oslo, Norway
2012–2013

Undergraduate Research Fellow
REU IN MATRIX ANALYSIS

William and Mary
2010

Undergraduate Research Fellow
DEPARTMENT OF PHYSICS

James Madison University
2009

Community Service

Instructor
HARVARD AIKIKAI

Harvard U.
2017–2021

Member, Board of Directors
AIKIDO TEKKOJUKU OF BOSTON

Somerville, MA
2017–2020

Analytics Consultant
HEALTH LEADS

Boston, MA
2015–2016

Cofounder and Director
NINJAGRAM CHARITIES

Swarthmore, PA
2010–2012

Assistant Children's Instructor
AIKIDO KOKIKAI OF SWARTHMORE

Swarthmore, PA
2011–2012

Skills

Software Julia, R, Python, \LaTeX , Linux
Languages English, German (reading), Norwegian Bokmål (reading)
Aikido 1st Dan, Aikikai Foundation