

# Philip S. Chodrow

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## Academic Positions

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### Hedrick Visiting Assistant Adjunct Professor (Postdoctoral)

Los Angeles, CA

DEPARTMENT OF MATHEMATICS, UNIVERSITY OF CALIFORNIA, LOS ANGELES

2020 -

Mentor: Mason Porter

## Education

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### PhD in Operations Research

Cambridge, MA

MASSACHUSETTS INSTITUTE OF TECHNOLOGY (MIT)

2015 - 2020

Mentors: Marta González and Patrick Jaillet

### B. A. with High Honors in Mathematics and Philosophy, $\Phi$ BK

Swarthmore, PA

SWARTHMORE COLLEGE

2008 - 2012

## Publications

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### PEER-REVIEWED

8. Kawakatsu, M., **PSC**, Eikmeier, N., and Larremore, D. B. (2021). Emergence of hierarchy in networked endorsement dynamics. *Proceedings of the National Academy of Sciences*, 118(16)
7. **PSC** (2020b). Moments of uniformly random multigraphs with fixed degree sequences. *SIAM Journal on Mathematics of Data Science*, 2(4):1034–1065
6. **PSC** (2020a). Configuration models of random hypergraphs. *Journal of Complex Networks*, 8(3):cnaa018
5. **PSC** and Mucha, P. J. (2020). Local symmetry and global structure in adaptive voter models. *SIAM Journal on Applied Mathematics*, 80(1):620–638
4. **PSC** and Mellor, A. (2020). Annotated hypergraphs: Models and applications. *Applied Network Science*, 5(1):1–9
3. **PSC** (2017b). Structure and information in spatial segregation. *Proceedings of the National Academy of Sciences*, 114(44):11591–11596
2. **PSC**, Al-Awwad, Z., Jiang, S., and González, M. C. (2016). Demand and congestion in multiplex transportation networks. *PLoS ONE*, 11(9):e0161738
1. **PSC**, Franks, C., and Lins, B. (2013). Upper and lower bounds for the iterates of order-preserving homogeneous maps on cones. *Linear Algebra and its Applications*, 439(4):999–1005

### PREPRINTS

4. **PSC**, Veldt, N., and Benson, A. R. (2021). Generative hypergraph clustering: From blockmodels to modularity. *arXiv:2101.09611*
3. Schwarze, A. C., **PSC**, and Porter, M. A. (2019). Log-minor distributions and an application to estimating mean subsystem entropy. *arXiv:1901.09456*
2. Strano, E., **PSC**, and González, M. C. (2019). Heterogeneous dynamics of human settlement. *In preparation*.
1. **PSC** (2017a). Divergence, entropy, information: An opinionated introduction to information theory. *arXiv:1708.07459*

## Awards & Grants

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### NSF Graduate Research Fellowship (GRFP)

NATIONAL SCIENCE FOUNDATION

Cambridge, USA

2017-2020

### Goodwin Teaching Award Nominee

MIT OPERATIONS RESEARCH CENTER

Cambridge, USA

2018

Recognizing a graduate teaching assistant who displays “conspicuously effective teaching.”

### Research Fellow, Center for the Study of Mind and Nature

U.S.–NORWAY FULBRIGHT PROGRAM

Oslo, Norway

2012-13

### Ivy Award

SWARTHMORE COLLEGE

Swarthmore, USA

2012

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

## Talks

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### INVITED

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|------|---|-----------------|
| 2021 | <b>Generative Community Detection in Hypergraphs</b><br>Satellite on Higher-Order Models in Network Science, Conference on Network Science        | Online          |
| 2021 | <b>Feedback Loops from Ranking in Networks</b><br>UCLA Undergraduate Mathematics Students' Association (UMSA)                                     | Online          |
| 2021 | <b>Emergence of Hierarchy in Networked Endorsement Dynamics</b><br>SIAM Conference on Dynamical Systems: Minisymposium on Inequity and Inequality | Online          |
| 2021 | <b>Hypergraph Clustering: from Blockmodels to Modularity</b><br>Workshop on Graphs and Complex Structures for Learning and Reasoning, AAAI        | Online          |
| 2020 | <b>Random Graphs for Data Science</b><br>Porter Lab   | UCLA (Online)   |
| 2020 | <b>Moments of Uniformly Random Multigraphs</b><br>MIT ORC Student Seminar   | MIT             |
| 2020 | <b>Local Techniques in Adaptive Voter Models</b><br>AMS Eastern Sectional Meeting   | Tufts U.        |
| 2019 | <b>The Structure of Spatial Segregation</b><br>Conference on Complex Systems  | Singapore       |
| 2019 | <b>Divergence, Entropy, Information</b><br>Society of Young Network Scientists  | Burlington, VT  |
| 2019 | <b>Configuration Models of Random Hypergraphs</b><br>Network Science Institute  | Northeastern U. |
| 2018 | <b>“What’s the Fuss About Power Laws?”</b><br>MIT ORC Student Seminar   | MIT             |
| 2017 | <b>The Structure of Spatial Segregation</b><br>Growth Lab   | Harvard         |

### INVITED PANELS

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|------|---|--------|
| 2021 | <b>Educational Panel For Early-Stage Researchers</b><br>Northeastern Regional Conference on Complex Systems   | Online |
| 2021 | <b>Perspectives on Graphs and Complex Structures for Learning and Reasoning</b><br>Workshop on Graphs and Complex Structures for Learning and Reasoning, AAAI | Online |

### CONTRIBUTED

2021	Conference on Network Science (NetSci)	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	Northeastern U.
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

## POSTERS

2020	Northeastern Regional Conference on Complex Systems (NERCCS), <b>Best Poster Award</b>	SUNY Buffalo
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## Teaching

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### Python Programming with Applications II

*UCLA Dept. of Mathematics*

INSTRUCTOR OF RECORD

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.

### PIC16A: Python Programming with Applications I

*UCLA Dept. of Mathematics*

INSTRUCTOR OF RECORD

2020

A flipped and project-based introduction to Python programming, with an emphasis on scientific computing, data analysis, and machine learning. Delivered remotely due to the COVID19 pandemic. Original syllabus and design.

### Computing in Optimization and Statistics

*MIT ORC*

ORGANIZER AND INSTRUCTOR

2015 - 2020

A graduate student-led seminar 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.

## Training

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### Introduction to Evidence-Based Pedagogy

*UCLA CEILS*

PARTICIPANT

2020

Participant in a course taught through UCLA's Center for Education Innovation and Learning in the Sciences (CEILS) 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.

## Software

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### 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 [\(Link\)](#)

## Outreach and Engagement

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### 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 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 upcoming original production on machine learning and artificial intelligence.

### MIT Seminar: Operations Research for Social Good

MIT

CO-ORGANIZER

2018

## Journal Reviews

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Nature Communications  
Nature Human Behavior  
Physical Review Letters  
Physical Review X  
Physical Review E  
Chaos  
Social Network Analysis and Mining  
Networks and Spatial Economics  
PLoS ONE  
International Journal of Geographic Information Systems

## Professional Societies

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

## Other Experience

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## Health Leads

DATA ANALYST

*Boston, USA*

2013-15

## Laboratory for Quantitative Medicine

RESEARCH ASSISTANT

*Cambridge, USA*

2012-14

## Center for the Study of Mind in Nature

VISITING RESEARCHER

*Oslo, Norway*

2012-13

## REU in Matrix Analysis

UNDERGRADUATE RESEARCH FELLOW

*William and Mary*

2010

## Department of Physics

UNDERGRADUATE RESEARCH FELLOW

*James Madison University*

2009

## Community Service

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### Harvard Aikikai

INSTRUCTOR

*Harvard U.*

2017 -

### Aikido Tekkojuku of Boston

MEMBER, BOARD OF DIRECTORS

*Somerville, MA*

2017 -

### Health Leads

ANALYTICS CONSULTANT

*Boston, MA*

2015 - 2016

### Ninjagram Charities

COFOUNDER AND DIRECTOR

*Swarthmore, PA*

2010 - 2012

### Aikido Kokikai of Swarthmore

ASSISTANT CHILDREN'S INSTRUCTOR

*Swarthmore, PA*

2011 - 2012

## Skills

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**Software** Julia, R, Python,  $\text{\LaTeX}$ , Linux

**Languages** English, German (reading), Norwegian Bokmål (reading)

**Aikido** 1st Dan, Aikikai Foundation