

# Nicholas W. Landry

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## Education

<b>University of Colorado Boulder</b> <i>PhD in Applied Mathematics</i> Advisor: Juan G. Restrepo Dissertation: "Contagion on Complex Systems: Structure and Dynamics"	<b>Boulder, CO</b> 2017–2022
<b>University of Colorado Boulder</b> <i>MS in Applied Mathematics</i>	<b>Boulder, CO</b> 2017–2020
<b>University of New Hampshire</b> <i>BS in Mechanical Engineering</i> University Honors, Summa Cum Laude	<b>Durham, NH</b> 2010–2014

## Professional experience

### Academic

<b>University of Virginia</b> <i>Assistant Professor of Biology</i>	<b>Charlottesville, VA</b> August 2024–
<b>University of Vermont</b> <i>TGIR Postdoctoral Research Fellow</i>	<b>Burlington, VT</b> 2022–August 2024
<b>University of Colorado Boulder</b> <i>Research Assistant</i>	<b>Boulder, CO</b> 2019–2022
<b>University of New Hampshire</b> <i>Research Assistant</i>	<b>Durham, NH</b> 2013–2015

### Industry

<b>Pacific Northwest National Laboratory</b> <i>PhD Intern in the Data Sciences and Analytics Group</i>	<b>Seattle, WA</b> Summer 2021
<b>Turbocam International</b> <i>Manufacturing Engineer</i>	<b>Barrington, NH</b> 2014–2017

## Funding

- [NSF Award 2309867](#), "Conference: Contagion on Complex Social Systems 2023,"  
**Co-writer** with Jean-Gabriel Young (PI; University of Vermont) 2023 \$47,838
- [NSF Award 2224051](#), "Conference: Computational Approaches for Contagion on Complex Social Systems"  
**Co-writer** with Juan G. Restrepo (PI; University of Colorado Boulder) 2022 \$34,770
- [NSF Award 2121905](#), "HNDS-I: Developing a software library for the analysis and visualization of spreading processes on social hypergraphs"  
**Co-writer** with Juan G. Restrepo (PI; University of Colorado Boulder) 2021–2022 \$80,193

## Publications

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### Journal articles.....

- **Nicholas W. Landry**, Jean-Gabriel Young, and Nicole Eikmeier, *The simpliciality of higher-order networks*, EPJ Data Science, 2024. DOI: [10.1140/epjds/s13688-024-00458-1](https://doi.org/10.1140/epjds/s13688-024-00458-1)
- **Nicholas W. Landry**, Ilya Amburg, Mirah Shi, and Sinan G. Aksoy, *Filtering higher-order datasets*, Journal of Physics: Complexity, 2024. DOI: [10.1088/2632-072X/ad253a](https://doi.org/10.1088/2632-072X/ad253a)
- **Nicholas W. Landry** and Juan G. Restrepo, *Opinion disparity in hypergraphs with community structure*, Physical Review E, 2023. DOI: [10.1103/PhysRevE.108.034311](https://doi.org/10.1103/PhysRevE.108.034311)
- **Nicholas W. Landry**, Maxime Lucas, Iacopo Iacopini, Giovanni Petri, Alice C. Schwarze, Alice Patania, and Leo Torres, *XGI: A Python package for higher-order interaction networks*, Journal of Open Source Software, 2023. DOI: [10.21105/joss.05162](https://doi.org/10.21105/joss.05162)
- **Nicholas W. Landry** and jimi adams, *On limitations of uniplex networks for modeling multiplex contagion*, PLoS ONE, 2023. DOI: [10.1371/journal.pone.0279345](https://doi.org/10.1371/journal.pone.0279345)
- **Nicholas W. Landry** and Juan G. Restrepo, *Hypergraph assortativity: a dynamical systems perspective*, Chaos, 2022. DOI: [10.1063/5.0086905](https://doi.org/10.1063/5.0086905)
- **Nicholas W. Landry**, *Effect of time-dependent infectiousness on epidemic dynamics*, Physical Review E, 2021. DOI: [10.1103/PhysRevE.104.064302](https://doi.org/10.1103/PhysRevE.104.064302)
- **Nicholas W. Landry** and Juan G. Restrepo, *The effect of heterogeneity on hypergraph contagion models*, Chaos, 2020. DOI: [10.1063/5.0020034](https://doi.org/10.1063/5.0020034)
- **Nicholas W. Landry** and Marko Knezevic, *Delineation of First-Order Elastic Property Closures for Hexagonal Metals Using Fast Fourier Transforms*, Materials, 2015. DOI: [10.3390/ma8095303](https://doi.org/10.3390/ma8095303)
- Marko Knezevic and **Nicholas W. Landry**, *Procedures for reducing large datasets of crystal orientations using generalized spherical harmonics*, Mechanics of Materials, 2015. DOI: [10.1016/j.mechmat.2015.04.014](https://doi.org/10.1016/j.mechmat.2015.04.014)

### Preprints.....

- **Nicholas W. Landry**, Will Thompson, Laurent Hébert-Dufresne, and Jean-Gabriel Young, *Complex contagions can outperform simple contagions for network reconstruction with dense networks or saturated dynamics*, Preprint, 2024. [arXiv:2405.00129](https://arxiv.org/abs/2405.00129)

### Conference proceedings.....

- Marko Knezevic, Daniel J. Savage, **Nicholas W. Landry**, *Towards Computationally Tractable Simulations of Metal Forming Processes With Evolving Microstructures*, Proceedings of the ASME International Manufacturing Science and Engineering Conference, 2014. DOI: [10.1115/MSEC2014-3984](https://doi.org/10.1115/MSEC2014-3984)

## Software

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- **Complex Group Interactions (XGI)**: Creator and Core Developer *NumFOCUS affiliated*
- **HyperContagion**: Creator and Core Developer
- **HyperNetX**: Contributor

## Presented work

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### Invited talks.....

- *Realistically modeling diseases: From data to models and back again* April 2024  
WINQ Program on Complex and Quantum Systems Stockholm, Sweden
- *Higher-order structure is more complex than current measures and models* April 2024  
Network Seminar Series of the CRI, LPI Paris
- *Modeling contagion processes with higher-order networks* February 2024  
University of Virginia
- *Modeling contagion processes with higher-order networks* January 2024  
Worcester Polytechnic Institute
- *Modeling contagion processes with higher-order networks* January 2024  
University at Buffalo
- *Limitations and opportunities from simple higher-order structural and contagion models*  
September 2023  
Vermont-KIAS Workshop: Group Interactions in Network Science Burlington, VT
- *Higher-order interaction networks: structure, dynamics, and inference* May 2023  
Workshop on Modelling and Mining Complex Networks as Hypergraphs Toronto, Canada
- *Higher-order models for social and epidemiological contagion* January 2023  
Network Science Institute at Northeastern Boston, MA
- *Community structure in hypergraphs and the emergence of polarization* October 2022  
AMS Fall Eastern Sectional Meeting Amherst, MA
- *Hypergraph dynamics: assortativity and the expansion eigenvalue* April 2022  
Joint Mathematics Meetings
- *Hypergraph assortativity: A dynamical systems perspective* March 2022  
APS March Meeting
- *Contagion on Complex Systems: Structure and Dynamics* January 2022  
Harvard Center for Communicable Disease Dynamics
- *Contagion on Complex Systems: Structure and Dynamics* January 2022  
University of Vermont
- *Contagion on Complex Systems: Structure and Dynamics* January 2022  
Dartmouth College
- *Contagion on Complex Systems: Structure and Dynamics* January 2022  
CU Boulder Applied Mathematics Dynamics Seminar
- *Hypergraph dynamics: a dynamical systems perspective* December 2021  
Graph Theory and its Applications session at the 2021 Winter Canadian Mathematical Society (CMS) Meeting
- *The effect of contact structure on hypergraph contagion models* May 2021  
Dynamics on Networks with Higher Order Interactions Minisymposium, SIAM Dynamical Systems Conference
- *The effect of heterogeneity on hypergraph contagion models* October 2020  
Fundamentos y Enseñanza de la Física y los Sistemas Dinámicos, Universidad de Antioquia
- *The effect of heterogeneity on hypergraph contagion models* September 2020  
CU Boulder Applied Mathematics Dynamics Seminar
- *Hypergraph Contagion* February 2020  
Colorado Chapter of Society of Young Network Scientists

## Contributed talks.....

- *Learnability of complex structure from contagion of various complexities* March 2024  
APS March Meeting Minneapolis, MN
- *XGI: A Python package for higher-order interaction networks* July 2023  
NetSci Vienna, Austria
- *Hypergraph community structure and the emergence of polarization* October 2022  
Conference on Complex Systems Palma, Spain
- *Hypergraph community structure and the emergence of polarization* September 2022  
SIAM Network Science Workshop
- *Hypergraph community structure and the emergence of polarization* July 2022  
NetSci
- *Hypergraph community structure and the emergence of polarization* March 2022  
Northeast Regional Conference on Complex Systems (Best Oral Presentation)
- *Hypergraph dynamics: assortativity and the expansion eigenvalue* November 2021  
International Conference on Complex Networks and their Applications
- *On limitations of uniplex networks for modeling multiplex diffusion* July 2021  
Networks
- *Hypergraph community structure and the emergence of polarization* June 2021  
TopoNets: Networks Satellite
- *The effect of time-dependent infectiousness on epidemic dynamics* March 2021  
Front Range Applied Mathematics Student Conference
- *The effect of heterogeneity on hypergraph contagion models* September 2020  
TopoNets: NetSci Satellite Conference
- *Improvisatory Elements of Teaching* February 2019  
Workshop for the Graduate Teacher Program Boulder, CO
- *So You Think You're Bad at Math* January 2019  
Ignite Talk for the Graduate Teacher Program's Spring Conference Boulder, CO
- *Music Data Mining: Finding Structure in Song* Fall 2018  
Statistics, Optimization, and Machine Learning Seminar, Applied Math Boulder, CO

## Posters.....

- *Community structure in hypergraphs and the emergence of polarization* January 2022  
Dynamics Days
- *The effect of time-dependent infectiousness on epidemic dynamics* March 2021  
Northeastern Regional Conference on Complex Systems
- *The effect of heterogeneity on hypergraph contagion models* August 2020  
Dynamics Days Digital
- *The effect of simplex and network degree distribution on simplicial contagion models* January 2020  
Dynamics Days Hartford, CT

## Tutorials.....

- *GSNP Short Course on Higher Order Network Science* March 2024  
APS March Meeting Minneapolis, MN

## Software demonstrations.....

- *XGI* May 2023  
Workshop on Modelling and Mining Complex Networks as Hypergraphs Toronto, Canada

- *XGI* October 2022  
TopoNets Satellite Conference of the Conference on Complex Systems Palma, Spain
- *XGI* July 2022  
Higher-Order Models in Network Science Satellite Conference of NetSci Online
- *XGI and HyperContagion* August 2022  
Contagion on Complex Social Systems Workshop Boulder, CO

## Teaching

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### Experience

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**University of Colorado Boulder** **Boulder, CO**  
*Instructor* *Summer 2020*  
 Taught Calculus 1 for Engineers to 20 students five days a week in a remote learning setting; managed a teaching assistant, presented concepts, and developed course material and exams.

**University of Colorado Boulder** **Boulder, CO**  
*Teaching Assistant* *2017-Present*  
 ○ Calculus 1 for Engineers (APPM 1350): Fall 2017  
 ○ Calculus 2 for Engineers (APPM 1360): Spring 2018, Summer 2019, Fall 2019  
 ○ Calculus 3 for Engineers (APPM 2350): Fall 2018  
 ○ Differential Equations and Linear Algebra (APPM 2360): Spring 2019, Fall 2020, Spring 2021  
 ○ Matrix Methods (APPM 3310): Spring 2020

### Certifications

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**Certificate in College Teaching** **Boulder, CO**  
*Graduate Teacher Program* *November 2018*  
 ○ Attended 20 hours of teaching-related workshops  
 ○ Observed by a faculty member to vouch for my teaching  
 ○ Participated in 2 consultations using video footage from my class  
 ○ Attended 20 hours of discipline-specific teaching workshops.  
 ○ Wrote a teaching portfolio, outlining my teaching experience, skills, and philosophy

## Awards

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- Chief Student Marshal for UNH Commencement 2014 based on GPA and contributions to the college 2014
- Mechanical Engineering Faculty Choice Award for Poster at UNH Undergraduate Research Conference 2014
- Nominee for the Goldwater Scholarship; 1 of 4 students representing UNH 2012
- Eagle Scout 2008

## Students mentored

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**Yifei (Bell) Luo** **Middlebury, VT**  
*Undergraduate student at Middlebury College* *2024*  
 Project title: "Efficient sampling of configuration model random hypergraphs"  
 Co-mentored with Phil Chodrow

**Will Thompson** **Burlington, VT**  
*Master's student in the Vermont Complex Systems Center* *2022-2024*  
 Project title: "Complex contagions can outperform simple contagions for network reconstruction with dense networks or saturated dynamics"

<b>Erik Weis</b> <i>Master's student in the Vermont Complex Systems Center</i> Project title: "Inferring global rankings from group-level local rankings"	<b>Burlington, VT</b> 2022-2023
<b>Beckett Hyde</b> <i>Undergraduate student in Applied Mathematics at CU Boulder</i> Project title: "A theoretical framework for neuromorphic computing on networks of organic electrochemical transistors" <i>Co-mentored with Juan G. Restrepo</i>	<b>Boulder, CO</b> 2022-2024
<b>Emerson McMullen and Arjun Asija</b> <i>Undergraduate students at Harvey Mudd College</i> Project title: "The stability of Supreme Court ideology and resistance to court-packing" <i>Co-mentored with Juan G. Restrepo and Heather Zinn Brooks</i>	<b>Boulder, CO</b> 2022

## Service

### Leadership and mentoring.....

<b>University of Colorado Boulder</b> <i>Graduate Peer Mentor</i> Met with students over the course of the semester to check in and offer support	<b>Boulder, CO</b> 2020-2021
<b>CU Boulder Applied Math Department</b> <i>Lead Teaching Assistant</i> <ul style="list-style-type: none"> <li>○ Led a weekly seminar for 15 first year students</li> <li>○ Facilitated video consultations to student TAs to help develop effective teaching skills</li> <li>○ Informed students about important topics, like obtaining residency, finding a research advisor, summer opportunities, and succeeding as a grad student</li> </ul>	<b>Boulder, CO</b> 2018-2019
<b>CU Boulder Applied Math Department</b> <i>Graduate Student Representative</i> <ul style="list-style-type: none"> <li>○ Gathered student input through polls and meetings</li> <li>○ Met with the Applied Mathematics graduate committee to voice student concerns</li> <li>○ Collaborated with students and faculty to help create policies agreeable to both parties</li> </ul>	<b>Boulder, CO</b> 2018-2019
<b>I Have a Dream Foundation of Boulder County</b> <i>Tutoring Volunteer</i> Tutored students in the local school district in math and science	<b>Lafayette, CO</b> 2018
<b>University of New Hampshire</b> <i>Vice President of UNH Chapter of Pi Mu Epsilon</i>	<b>Durham, NH</b> 2012-2013

### Conferences and seminars organized.....

<b>Talkbocopus seminar series</b> <i>Co-organizer</i>	<b>Burlington, VT</b> Fall 2022 - present
<b>Contagion on Complex Social Systems Workshop (CCSS)</b> <i>Co-chair</i>	<b>Burlington, VT</b> August 14-16, 2023
<b>TopoNets satellite conference at NetSci</b> <i>Co-organizer</i>	<b>Vienna, Austria</b> July 10, 2023
<b>Models and Methods for Sparse (Hyper) Network Science at JMM</b> <i>Co-organizer</i>	<b>Boston, MA</b> January 6, 2023
<b>TopoNets symposium at the Conference on Complex Systems</b> <i>Co-organizer</i>	<b>Palma, Spain</b> October 20, 2022

## Contagion on Complex Social Systems Workshop (CCSS)

Co-chair

Boulder, CO

August 10-12, 2022

## CU Boulder Applied Math Department

Joint coordinator of the Dynamical Systems seminar

Boulder, CO

Spring 2021, 2022

## Program committees

### NetSci 2024

Program committee member

Quebec City, Quebec, Canada

June 16-21, 2024

### Workshop on Modelling and Mining Networks

Program committee member

Warsaw, Poland

June 3-7, 2024

## Peer review

### Journals

Nature Communication Physics; Nature Communications; Physical Review Research; Scientific Reports; Physical Review E; Chaos, Solitons, and Fractals; Science Advances; Journal of Statistical Physics; Chaos; npj Complexity

### Conferences

Algorithm Engineering and Experiments (2022)

## Other professional activities

### Workshops attended

- WINQ Program on Complex and Quantum Systems  
Participant April 2024  
Stockholm, Sweden
- Complex Networks Winter Workshop  
Participant December 2023  
Quebec City, Quebec, Canada
- MRC: Complex Social Systems  
Participant June 2023  
Buffalo, NY
- Modeling Pandemic Intervention Acceptance for Disease Mitigation  
Participant April 2023  
Online
- JSMF-SFI Postdocs in Complexity Conference X  
Participant March 2023  
Santa Fe, NM
- MRC: Models and Methods for Sparse (Hyper) Network Science  
Participant June 2022  
Buffalo, NY
- Complex Networks Winter Workshop (CNWW)  
Participant January 2021  
Online
- Statistics and Modeling with Novel Data Streams at the SISIMID summer school  
Participant June 2020  
Online
- Understanding and Exploring Network Epidemiology in the Time of Coronavirus  
Participant April 2020  
Online

### Organizations and affiliations

- Society for Industrial and Applied Mathematics (SIAM)
- The American Mathematical Society (AMS)
- The American Physical Society (APS)

- The Network Science Society
- The Complex Systems Society

## Media.....

- *Interactions Within Larger Social Groups Can Cause Tipping Points in Contagion Flow*  
October 20th, 2020  
AIP Press Release
- *Contagion on Complex Networks*  
February 3rd, 2020  
Radio, Season 3 Episode 13, Probably Novel at University of Colorado Boulder

## Travel Grants

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|---|-------------------|
| ○ <i>CU Boulder Graduate School Student Travel Grant</i>                      | <i>2020, 2022</i> |
| ○ <i>2022 JMM Grad Student Travel Grant</i>                                   | <i>2022</i>       |
| Awarded a \$1,300 travel grant  |                   |
| ○ <i>Networks 2021 Registration Waiver</i>                                    | <i>2021</i>       |
| Awarded a registration waiver for Networks 2021 which is being held virtually |                   |
| ○ <i>SIAM Student Travel Award</i>  | <i>2021</i>       |
| Awarded a registration waiver for SIAM DS 2021 which is being held virtually  |                   |