

# Nicholas W. Landry

✉ [nicholas.landry@virginia.edu](mailto:nicholas.landry@virginia.edu) • [nwlandry.com](https://nwlandry.com) • [nwlandry](https://twitter.com/nwlandry)  
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## Education

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<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

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### Academic

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<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

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<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

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- [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**, Beckett R. Hyde, Jake C. Perez, Sean E. Shaheen, and Juan G. Restrepo, *A theoretical framework for reservoir computing on networks of organic electrochemical transistors*, Preprint, 2024. [arXiv:2408.09223](https://arxiv.org/abs/2408.09223)
- Laurent Hébert-Dufresne, Matthew M. Kling, Samuel F. Rosenblatt, Stephanie N. Miller, P. Alexander Burnham, **Nicholas W. Landry**, Nicholas J. Gotelli, and Brian J. McGill, *Stochastic diffusion with approximate master equations with mean-field limits*, Preprint, 2024. [arXiv:2408.07755](https://arxiv.org/abs/2408.07755)
- **Nicholas W. Landry**, Will Thompson, Laurent Hébert-Dufresne, and Jean-Gabriel Young, *Reconstructing networks from simple and complex contagions*, 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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- **ComplexX 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.....

**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.....

**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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- Zachary Karate Club Award 2024
- 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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**Adeline Southard** **Burlington, VT**  
*Undergraduate student at UVM* 2024

Project title: "Is *C. difficile* a network-mediated contagion?"  
Co-mentored with Jean-Gabriel Young

**Yifei (Bell) Luo**

**Middlebury, VT**  
2024

*Undergraduate student at Middlebury College*

Project title: "Efficient sampling of configuration model random hypergraphs"  
Co-mentored with Phil Chodrow

**Will Thompson**

**Burlington, VT**  
2023-2024

*Master's student in the Vermont Complex Systems Center*

Project title: "Complex contagions can outperform simple contagions for network reconstruction with dense networks or saturated dynamics"

**Erik Weis**

**Burlington, VT**  
2022-2023

*Master's student in the Vermont Complex Systems Center*

Project title: "Inferring global rankings from group-level local rankings"

**Beckett Hyde**

**Boulder, CO**  
2022-2024

*Undergraduate student in Applied Mathematics at CU Boulder*

Project title: "A theoretical framework for neuromorphic computing on networks of organic electrochemical transistors"  
Co-mentored with Juan G. Restrepo

**Emerson McMullen and Arjun Asija**

**Boulder, CO**  
2022

*Undergraduate students at Harvey Mudd College*

Project title: "The stability of Supreme Court ideology and resistance to court-packing"  
Co-mentored with Juan G. Restrepo and Heather Zinn Brooks

## Service

### Leadership and mentoring.....

**University of Colorado Boulder**

**Boulder, CO**  
2020-2021

*Graduate Peer Mentor*

Met with students over the course of the semester to check in and offer support

**CU Boulder Applied Math Department**

**Boulder, CO**  
2018-2019

*Lead Teaching Assistant*

- Led a weekly seminar for 15 first year students
- Facilitated video consultations to student TAs to help develop effective teaching skills
- Informed students about important topics, like obtaining residency, finding a research advisor, summer opportunities, and succeeding as a grad student

**CU Boulder Applied Math Department**

**Boulder, CO**  
2018-2019

*Graduate Student Representative*

- Gathered student input through polls and meetings
- Met with the Applied Mathematics graduate committee to voice student concerns
- Collaborated with students and faculty to help create policies agreeable to both parties

**I Have a Dream Foundation of Boulder County**

**Lafayette, CO**  
2018

*Tutoring Volunteer*

Tutored students in the local school district in math and science

**University of New Hampshire**

**Durham, NH**  
2012-2013

*Vice President of UNH Chapter of Pi Mu Epsilon*

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

**Talkbocopus seminar series**

**Burlington, VT**  
Fall 2022 - present

*Co-organizer*

<b>Contagion on Complex Social Systems Workshop (CCSS)</b> <i>Co-chair</i>	<b>Burlington, VT</b> <i>August 14-16, 2023</i>
<b>TopoNets satellite conference at NetSci</b> <i>Co-organizer</i>	<b>Vienna, Austria</b> <i>July 10, 2023</i>
<b>Models and Methods for Sparse (Hyper) Network Science at JMM</b> <i>Co-organizer</i>	<b>Boston, MA</b> <i>January 6, 2023</i>
<b>TopoNets symposium at the Conference on Complex Systems</b> <i>Co-organizer</i>	<b>Palma, Spain</b> <i>October 20, 2022</i>
<b>Contagion on Complex Social Systems Workshop (CCSS)</b> <i>Co-chair</i>	<b>Boulder, CO</b> <i>August 10-12, 2022</i>
<b>CU Boulder Applied Math Department</b> <i>Joint coordinator of the Dynamical Systems seminar</i>	<b>Boulder, CO</b> <i>Spring 2021, 2022</i>

<b>Program committees</b> .....	
<b>NetSci 2024</b> <i>Program committee member</i>	<b>Quebec City, Quebec, Canada</b> <i>June 16-21, 2024</i>
<b>Workshop on Modelling and Mining Networks</b> <i>Program committee member</i>	<b>Warsaw, Poland</b> <i>June 3-7, 2024</i>

**Peer review**.....

## Journals

BMC Bioinformatics; Chaos; Chaos, Solitons, and Fractals; Journal of Epidemiology and Global Health; Journal of Machine Learning Research; Journal of Open Source Software; Journal of Statistical Physics; Mathematical Biosciences; Nature Communications; Nature Communication Physics; npj Complexity; Physical Review E; Physical Review Research; PLoS ONE; Science Advances; Scientific Reports

## Conferences

Algorithm Engineering and Experiments (2022)

## Other professional activities

**Workshops attended**.....

○ WINQ Program on Complex and Quantum Systems Participant	<i>April 2024</i> Stockholm, Sweden
○ Complex Networks Winter Workshop Participant	<i>December 2023</i> Quebec City, Quebec, Canada
○ MRC: Complex Social Systems Participant	<i>June 2023</i> Buffalo, NY
○ Modeling Pandemic Intervention Acceptance for Disease Mitigation Participant	<i>April 2023</i> Online
○ JSMF-SFI Postdocs in Complexity Conference X Participant	<i>March 2023</i> Santa Fe, NM
○ MRC: Models and Methods for Sparse (Hyper) Network Science Participant	<i>June 2022</i> Buffalo, NY

- *Complex Networks Winter Workshop (CNWW)* *January 2021*  
Participant Online
- *Statistics and Modeling with Novel Data Streams at the SISIMID summer school* *June 2020*  
Participant Online
- *Understanding and Exploring Network Epidemiology in the Time of Coronavirus* *April 2020*  
Participant 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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- *CU Boulder Graduate School Student Travel Grant* *2020, 2022*
- *2022 JMM Grad Student Travel Grant* *2022*  
Awarded a \$1,300 travel grant
- *Networks 2021 Registration Waiver* *2021*  
Awarded a registration waiver for Networks 2021 which is being held virtually
- *SIAM Student Travel Award* *2021*  
Awarded a registration waiver for SIAM DS 2021 which is being held virtually