

Nicholas W. Landry

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Education

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

Positions

Academic

University of Virginia <i>Assistant Professor of Biology</i>	Charlottesville, VA August 2024–
Vermont Complex Systems Institute at the University of Vermont <i>External Faculty</i>	Burlington, VT August 2024–
University of Vermont <i>TGIR Postdoctoral Research Fellow</i>	Burlington, VT 2022–August 2024

Industry

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

Publications

Journal articles

- 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*, Accepted at Royal Society Open Science, 2025. [arXiv:2408.07755](https://arxiv.org/abs/2408.07755)
- Laurent Hébert-Dufresne, **Nicholas W. Landry**, Juniper Lovato, Jonathan St-Onge, Jean-Gabriel Young, Marie-Ève Couture-Ménard, Stéphane Bernatchez, Catherine Choquette, and Alan A. Cohen, *Governance as a complex, networked, democratic, satisfiability problem*, npj Complexity, 2025. DOI: [10.1038/s44260-025-00041-3](https://doi.org/10.1038/s44260-025-00041-3)
- **Nicholas W. Landry**, Will Thompson, Laurent Hébert-Dufresne, and Jean-Gabriel Young, *Reconstructing networks from simple and complex contagions*, Physical Review E, 2024. DOI: [10.1103/PhysRevE.110.L042301](https://doi.org/10.1103/PhysRevE.110.L042301)
- **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. (Editor's Choice) 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)

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)

Book chapters.....

- Emma Zajdela and **Nicholas W. Landry**, *Hypergraph Methods for Predicting Team Formation in Science*, Hypergraph Methods in Intelligence Analysis, edited by Hasenjager, M., Fefferman, N. and Bailey, M., 2025. *In press*. [invited chapter]

Preprints.....

- Martín Coll, Cliff A. Joslyn, **Nicholas W. Landry**, Quintino Francesco Lotito, Audun Myers, Joshua Pickard, Brenda Praggastis, and Przemysław Szufel, *HIF: The hypergraph interchange format for higher-order networks*, Preprint, 2025. [arXiv:2507.11520](https://arxiv.org/abs/2507.11520)
- Alyssa Smith, Ilya Amburg, Sagar Kumar, Brooke Foucault Welles, and **Nicholas W. Landry**, *A Blue Start: A large-scale pairwise and higher-order social network dataset*, Preprint, 2025. [arXiv:2408.09223](https://arxiv.org/abs/2408.09223)
- **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)

Software

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

Funding

- **PI**, [UVA DAC Small Data Analytics Resource Award](#), “Analyzing large-scale social networks through the Bluesky social media platform”, 2025-2026

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

Supervision

Postdoctoral Fellows

- Daniel Kaiser, University of Virginia, 2025-

PhD Students

- Abhay Gupta, University of Virginia, 2025-
- Andy Grieve, University of Virginia, 2025-
Primary advisor: Katja Kasimatis
- Charlotte Greene, University of Virginia, 2025-
Primary advisor: Butch Brodie

Master's Students

- Will Thompson, University of Vermont, 2023-2024
- Erik Weis, University of Vermont, 2022-2023

Undergraduate Students

- Ahmed Ahmed, University of Virginia, 2025
Co-mentored with Baltazar Espinoza
- Yifei Luo, Middlebury College, 2024-2025
Co-mentored with Phil Chodrow
- Adeline Southard, University of Vermont, 2024
Co-mentored with Jean-Gabriel Young
- Beckett Hyde, University of Colorado Boulder, 2022-2024
Co-mentored with Juan G. Restrepo
- Emerson McMullen, Harvey Mudd College, 2022
Co-mentored with Juan G. Restrepo and Heather Zinn Brooks
- Arjun Asija, Harvey Mudd College, 2022
Co-mentored with Juan G. Restrepo and Heather Zinn Brooks

Presented work

Invited talks

- *Opinion disparity in hypergraphs with community structure: theory and practice* May 2025
SIAM Dynamical Systems Denver, CO
- *Realistically modeling diseases: From data to models and back again* March 2025
Bryn Mawr College Bi-Co Mathematics Colloquium Bryn Mawr, PA
- *Realistically modeling diseases: From data to models and back again* February 2025
University of Virginia Statistics Colloquium Charlottesville, VA
- *Realistically modeling diseases: From data to models and back again* November 2024
Grinnell College Grinnell, IA
- *Opinion disparity in hypergraphs with community structure: theory and practice* October 2024
DIMACS Workshop at Rutgers University New Brunswick, NJ

- *Modeling contagion processes with noisy and uncertain networks* October 2024
Graph and Network Data Seminar at the University of Virginia Charlottesville, VA
- *Modeling contagion processes with noisy and uncertain networks* October 2024
EEBio Seminar at the University of Virginia Charlottesville, VA
- *Reconstructing networks from complex social processes* September 2024
Quantitative Collaborative Seminar at the University of Virginia Charlottesville, VA
- *Complex Group Interactions (XGI)* June 2024
Software Tools for Network Science Satellite at NetSci Quebec City, Quebec, Canada
- *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.....

- *Efficient sampling from the hypergraph configuration model* June 2025
NetSci Maastricht, the Netherlands
- *Governance as a complex, networked, democratic, satisfiability problem* March 2025
APS Global Physics Summit Anaheim, CA
- *Nonparametric approach to network reconstruction from time-series data* June 2024
NetSci Quebec City, Quebec, Canada
- *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.....

- *Reconstructing networks from simple and complex contagions* January 2025
Dynamics Days
- *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.....

- *Minitutorial: A Practical Guide to Modeling with Higher-order Networks* May 2025
SIAM Conference on Applications of Dynamical Systems Denver, CO
- *GSNP Short Course on Higher Order Network Science* March 2024
APS March Meeting Minneapolis, MN

Software demonstrations.....

- *XGI* May 2025
Conference on Applications of Dynamical Systems Denver, CO
- *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

Experience.....

University of Virginia **Charlottesville, VA**
Instructor 2025-Present

- Networks in Biology: From Pandemics to Ecosystems (BIOL 4559): Fall 2025

University of Colorado Boulder **Boulder, CO**
Instructor 2020

- Calculus 1 for Engineers (APPM 1350): Summer 2020

University of Colorado Boulder **Boulder, CO**
Teaching Assistant 2017-2021

- 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

- 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

Service

PhD committees.....

- Charlotte Greene

DMP second reader.....

- Reece Anderson, 2025
- Griffin Jiron, 2025

Leadership.....

- Graduate Peer Mentor, University of Colorado Boulder, 2020-2021
- Lead Teaching Assistant, University of Colorado Boulder, 2018-2019
- Graduate Student Representative, University of Colorado Boulder, 2018-2019
- Tutor, I Have a Dream Foundation of Boulder County, 2018
- Vice President of UNH Chapter of Pi Mu Epsilon, University of New Hampshire, 2012-2013

Conferences and seminars organized.....

Contagion on Complex Social Systems Workshop (CCSS)

Co-chair

- Burlington, VT, August 14-16, 2023
- Boulder, CO, August 10-12, 2022

Software and Data for Supporting Network Science satellite workshop

Co-chair

- Maastricht, Netherlands, June 2, 2025 (Co-located with NetSci)

TopoNets satellite workshop

Co-organizer

- Maastricht, Netherlands, June 2, 2025 (Co-located with NetSci)
- Quebec City, Canada, June 17, 2024 (Co-located with NetSci)
- Vienna, Austria, July 10, 2023 (Co-located with NetSci)
- Palma, Spain, October 20, 2022 (Co-located with CCS)

Talkbocopus seminar series

Co-organizer

Burlington, VT
Fall 2022 - Spring 2023

Models and Methods for Sparse (Hyper) Network Science

Co-organizer

- Boston, MA, January 6, 2023 (Co-located with JMM)

CU Boulder Applied Math Department

Joint coordinator of the Dynamical Systems seminar

Boulder, CO
Spring 2021, 2022

Program committees.....

- The International School and Conference on Network Science (NetSci): 2024, 2025
- Workshop on Modelling and Mining Networks (WAW): 2024, 2025

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 Physics: Complexity; Journal of Statistical Physics; Mathematical Biosciences; Nature Communications; Nature Communication Physics; npj Complexity; Physical Review E; Physical Review Letters; Physical Review Research; PLoS Complex Systems; PLoS ONE; Science Advances; Scientific Reports

Conferences

Algorithm Engineering and Experiments (2022)

Other professional activities

Workshops attended.....

- *The Course Design Institute at the University of Virginia* *May 2025*
Participant Charlottesville, VA
- *Workshop on Spreading on Social Networks at DIMACS at Rutgers* *October 2024*
Participant New Brunswick, NJ
- *WINQ Program on Complex and Quantum Systems* *April 2024*
Participant Stockholm, Sweden
- *Complex Networks Winter Workshop* *December 2023*
Participant Quebec City, Quebec, Canada
- *MRC: Complex Social Systems* *June 2023*
Participant Buffalo, NY
- *Modeling Pandemic Intervention Acceptance for Disease Mitigation* *April 2023*
Participant Online
- *JSMF-SFI Postdocs in Complexity Conference X* *March 2023*
Participant Santa Fe, NM
- *MRC: Models and Methods for Sparse (Hyper) Network Science* *June 2022*
Participant 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.....

- *Reconstructing networks from simple and complex contagions*
October 28th, 2024
Quantum Photonics Club podcast
- *Are Ideas Contagious?*
October 9th, 2024
University of Virginia College of Arts & Sciences Press Release

- *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

- *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