Nicholas W. Landry

nicholas.landry@virginia.edu • nwlandry.com • nwlandry

Education

University of Colorado Boulder — **Boulder, CO**
PhD in Applied Mathematics — *2017–2022*
Advisor: Juan G. Restrepo
Dissertation: "Contagion on Complex Systems: Structure and Dynamics"

University of Colorado Boulder — **Boulder, CO**
MS in Applied Mathematics — *2017–2020*

University of New Hampshire — **Durham, NH**
BS in Mechanical Engineering — *2010–2014*
University Honors, Summa Cum Laude

Professional experience

Academic

University of Virginia — **Charlottesville, VA**
Assistant Professor of Biology — *August 2024–*

Vermont Complex Systems Institute at the University of Vermont — **Burlington, VT**
External Faculty — *August 2024–*

University of Vermont — **Burlington, VT**
TGIR Postdoctoral Research Fellow — *2022–August 2024*

University of Colorado Boulder — **Boulder, CO**
Research Assistant — *2019–2022*

University of New Hampshire — **Durham, NH**
Research Assistant — *2013–2015*

Industry

Pacific Northwest National Laboratory — **Seattle, WA**
PhD Intern in the Data Sciences and Analytics Group — *Summer 2021*

Turbocam International — **Barrington, NH**
Product Engineer — *2014–2017*

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*

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
- 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
- **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
- **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
- **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
- **Nicholas W. Landry** and Juan G. Restrepo, *Opinion disparity in hypergraphs with community structure*, Physical Review E, 2023. DOI: 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
- **Nicholas W. Landry** and jimi adams, *On limitations of uniplex networks for modeling multiplex contagion*, PLoS ONE, 2023. DOI: 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
- **Nicholas W. Landry**, *Effect of time-dependent infectiousness on epidemic dynamics*, Physical Review E, 2021. DOI: 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
- **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
- 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

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

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. [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
- 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
- **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

Software

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

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 Charlotteville, VA
- *Modeling contagion processes with noisy and uncertain networks* *October 2024*
  EEBio Seminar at the University of Virginia Charlotteville, VA
- *Reconstructing networks from complex social processes* *September 2024*
  Quantitative Collaborative Seminar at the University of Virginia Charlotteville, 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 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

- 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*

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, Undergraduate student, University of Virginia, 2025
  Co-mentored with Baltazar Espinoza
- Yifei Luo, Undergraduate student, Middlebury College, 2024-2025
  Co-mentored with Phil Chodrow
- Adeline Southard, Undergraduate student, 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

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)

Talkboctopus seminar series — **Burlington, VT**
Co-organizer — *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 — **Boulder, CO**
Joint coordinator of the Dynamical Systems seminar — *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

- *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 SISMID 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