Nicholas W. Landry

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

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**
Manufacturing Engineer — *2014–2017*

Funding

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

Publications

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
- **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. 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

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

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

Software

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

Presented work

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

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*

Students mentored

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**
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 *2023-2024*
Project title: "Complex contagions can outperform simple contagions for network reconstruction with dense networks or saturated dynamics"

Erik Weis **Burlington, VT**
Master's student in the Vermont Complex Systems Center *2022-2023*
Project title: "Inferring global rankings from group-level local rankings"

Beckett Hyde **Boulder, CO**
Undergraduate student in Applied Mathematics at CU Boulder *2022-2024*
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**
Undergraduate students at Harvey Mudd College *2022*
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**
Graduate Peer Mentor *2020-2021*
Met with students over the course of the semester to check in and offer support

CU Boulder Applied Math Department **Boulder, CO**
Lead Teaching Assistant *2018–2019*
- 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**
Graduate Student Representative *2018–2019*
- 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**
Tutoring Volunteer *2018*
Tutored students in the local school district in math and science

University of New Hampshire **Durham, NH**
Vice President of UNH Chapter of Pi Mu Epsilon *2012-2013*

Conferences and seminars organized

Talkboctopus seminar series **Burlington, VT**
Co-organizer *Fall 2022 - present*

Contagion on Complex Social Systems Workshop (CCSS) **Burlington, VT**
Co-chair *August 14-16, 2023*

TopoNets satellite conference at NetSci **Vienna, Austria**
Co-organizer *July 10, 2023*

Models and Methods for Sparse (Hyper) Network Science at JMM — **Boston, MA**
Co-organizer — *January 6, 2023*

TopoNets symposium at the Conference on Complex Systems — **Palma, Spain**
Co-organizer — *October 20, 2022*

Contagion on Complex Social Systems Workshop (CCSS) — **Boulder, CO**
Co-chair — *August 10-12, 2022*

CU Boulder Applied Math Department — **Boulder, CO**
Joint coordinator of the Dynamical Systems seminar — *Spring 2021, 2022*

Program committees

NetSci 2024 — **Quebec City, Quebec, Canada**
Program committee member — *June 16-21, 2024*

Workshop on Modelling and Mining Networks — **Warsaw, Poland**
Program committee member — *June 3-7, 2024*

Peer review

Journals

BMC Bioinformatics; Chaos; Chaos, Solitons, and Fractals; Journal of Machine Learning Research; Journal of Open Source Software; Journal of Statistical Physics; 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* — *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

- *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