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**, 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

○ 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

○ **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

○ Comple**X** **G**roup **I**nteractions (XGI): Creator and Core Developer   *NumFOCUS affiliated*

- ○ HyperContagion: Creator and Core Developer
- ○ HyperNetX: Contributor

Presented work

○ *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

- *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