Nicholas Landry

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nwlandry

Education

University of Colorado Boulder **Boulder, CO**
PhD in Applied Mathematics *2017–Present*
Advisor: Juan G. Restrepo
"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

Experience

Research

Pacific Northwest National Laboratory **Richland, WA**
PhD Intern in the Data Sciences and Analytics Group in the National Security Directorate *Summer 2021*
- Implemented a contagion module in the PNNL-developed HyperNetX library
- Drastically improved the efficiency of the HyperNetX hypergraph data structure

University of Colorado Boulder **Boulder, CO**
Research Assistant *2018–Present*
- Mentored by Juan G. Restrepo
- Modeling contagion processes on hypergraphs and examining the effect of heterogeneity, community, and assortativity on the resulting dynamics
- Modeling complex epidemic processes on networks
- Examining the effect that representing inherently multiplex data with uniplex networks has on epidemic dynamics
- Modeling reservoir computers with OECTs as activation units

University of New Hampshire **Durham, NH**
Research Assistant *2013–2015*
- Mentored by Prof. Marko Knezevic
- Awarded UNH Summer Undergraduate Research Fellowship (SURF) grant to conduct research
- Developed a metal microstructure data compaction method using FFT methods to make metal-forming simulations more computationally efficient; applied this framework to metals with cubic and hexagonal symmetries

Industry

Turbocam International **Barrington, NH**
Manufacturing Engineer *2014–2017*
- Led interdepartmental, large-scale projects
- Developed software applications for machine status tracking
- Implementing process and quality automation through developed software applications
- Helped improve manufacturing processes and created 5-axis mill programs

Funding

- *NSF Award 2121905*, "HNDS-I: Developing a software library for the analysis and visualization of spreading processes on social hypergraphs", $80,193 *2021-2022*
  Co-writer with Juan G. Restrepo (PI; University of Colorado Boulder)

Publications

- **Nicholas W. Landry**, jimi adams, *On limitations of uniplex networks for modeling multiplex diffusion*, In Preparation, 2021
- **Nicholas W. Landry**, Juan G. Restrepo, *Community structure in hypergraphs and the emergence of polarization*, In Preparation, 2021
- **Nicholas W. Landry**, Juan G. Restrepo, *Hypergraph dynamics: assortativity and the expansion eigenvalue*, Preprint, 2021. arXiv:2109.01099, Under Review
- **Nicholas W. Landry**, *The effect of time-dependent infectiousness on epidemic dynamics*, Preprint, 2021. arXiv:2106.10384, Accepted at Physical Review E
- **Nicholas W. Landry**, Juan G. Restrepo, *The effect of heterogeneity on hypergraph contagion models*, Chaos, 2020. DOI: 10.1063/5.0020034
- **Nicholas W. Landry**, Marko Knezevic, *Delineation of First-Order Elastic Property Closures for Hexagonal Metals Using Fast Fourier Transforms*, Materials, 2015. DOI: 10.3390/ma8095303
- Marko Knezevic, **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
- 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

Presented Work

Invited Talks

- *Hypergraph dynamics: assortativity and the expansion eigenvalue* *January 2022*
  Special Session on Combinatorial Approaches to Topological Structures and Applications at the Joint Mathematics Meetings 2022 Seattle, WA
- *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

- *Hypergraph dynamics: assortativity and the expansion eigenvalue* *November 2021*
  International Conference on Complex Networks and their Applications 2021

- *On limitations of uniplex networks for modeling multiplex diffusion* — *July 2021*
  Networks 2021
- *Hypergraph community structure and the emergence of polarization* — *June 2021*
  TopoNets 2021: Networks 2021 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 2020: NetSci 2020 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

- *The effect of time-dependent infectiousness on epidemic dynamics* — *March 2020*
  Northeastern Regional Conference on Complex Systems
- *The effect of heterogeneity on hypergraph contagion models* — *August 2020*
  Dynamics Days Digital 2020
- *The effect of simplex and network degree distribution on simplicial contagion models* — *January 2020*
  Dynamics Days — Hartford, CT

Software

- Comple**X** **G**roup **I**nteractions (XGI): A Python library for representing and analyzing complex systems with higher-order interactions.

Awards

- 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*

Leadership, Mentoring, and Service

CU Boulder Applied Math Department — **Boulder, CO**
Co-Coordinator of the Dynamical Systems seminar — *Spring 2021*

- Invited speakers and publicized talks along with Juan G. Restrepo and James Meiss

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 underprivileged 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*

Reviewer

Journals
Nature Communication Physics, Nature Communications

Conferences
Algorithm Engineering and Experiments (2022)

Teaching

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

Workshops

- *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

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

Travel Grants

- *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
- *CU Boulder Graduate School Student Travel Grant* *2020*
  Awarded a travel grant for Dynamics Days 2020

Organizations and Affiliations

- Society for Industrial and Applied Mathematics (SIAM)
- The Network Science Society
- International Network for Social Network Analysis

Media

- *Contagion on Complex Networks* February 3rd, 2020
  Radio, Season 3 Episode 13, Probably Novel at University of Colorado Boulder
- *Interactions Within Larger Social Groups Can Cause Tipping Points in Contagion Flow*
  AIP Press Release October 20th, 2020