Nick Payne

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Education

Pennsylvania State University, State College PA — *Fall 2023 -*
Ph.D in Mathematics

Northeastern University, Boston MA — *2022 - 2023*
M.S. Applied Mathematics — GPA: 3.96/4.0

Northeastern University, Boston MA — *2017 - 2022*
B.S. Mathematics and Minors in Data Science & Mechanical Engineering — GPA: 3.87/4.0

Papers

Hausdorff Dimension of Closure of Cycles in d-Maps on the Circle.
Joint with Mrudul Thatte. arXiv:2208.11837

An Exploration of the Symmetry Groups of Certain Configurations of Points.
Joint with Luke Boyer. arXiv:2108.13565

Research

Current — *Fall 2025-*
Advisors: Jessica Conway, Tim Reluga
Areas: mathematical oncology, infectious disease.

Summer Research — *Summer 2025*
Advisor: Alberto Bressan
Areas: Hyperbolic conservation laws, traffic dynamics.

Independent Study — *Summer 2022 - Summer 2023*
Mentor: Xuwen Zhu
Area: Dynamics on the unit disk. Resulted in a paper proving the Hausdorff dimensionality of the closure of degree-m cycles on the unit circle (with Mrudul Thatte). Also explored the behavior of the length of cycles of higher degree on the unit disk.

Undergraduate Research Capstone — *Spring 2022*
Mentor: Xuwen Zhu
Area: Minimal surfaces. Resulted in an expository paper detailing some conditions that cause minimal surfaces not to be area minimizing.

Northeastern University Summer Math Research Program *Summer 2021*
Mentors: Ian Dumais, Vance Blankers, Matej Penciak
Area: Configurations of points and lines. Resulted in a mostly expository paper that included a re-interpretation of a few small geometric results, and a proof-of-concept computer program used for the geometric realization of certain generalized cyclic configurations.
with Luke Boyer

Talks

Penn State University Math Club *February 2025*
Title: A Talk on Talks: How to give a successful (short) talk

AMS - PME Undergraduate Student Poster Session *January 2023*
JMM, Boston MA
Poster Title: Hausdorff Dimension of Closure of Cycles in d-Maps on the Circle

AMS Contributed Paper Session on Dynamical Systems *January 2023*
JMM, Boston MA
Title: Hausdorff Dimension of Closure of Cycles in d-Maps on the Circle

Undergraduate Research Presentations *May 2022*
Northeastern University Math Department
Title: When are Minimal Surfaces (Not) Area Minimizing?

REU Final Presentations *June 2021*
Northeastern University Summer Math Research Program
Title: An Exploration of the Symmetry Groups of Certain Configurations of Points
with Luke Boyer

Academic Involvement

At Pennsylvania State University:

- Speaker of the Assembly and Chair of the Steering Committee *Summer 2025 -*
  Graduate & Professional Student Association
- President, Graduate Student Association *Summer 2025 -*
  Mathematics Department
- Co-Chair, Graduate Student Subcommittee *Fall 2024 -*
  Eberly College of Sciences Climate and Diversity Committee
- Organizer:
  - Math Directed Reading Program *Fall 2025 -*
  - Undergraduate Math Club Short Talks Competition *March 2025*

At Northeastern University:

- Co-organizer, Math Directed Reading Program *Spring 2023*
  Mathematics Department

- Vice-President, Mathematics Engagement and Mentoring Association *Fall 2022*
  Mathematics Department
- Member, Diversity and Inclusion Committee *Fall 2021 - Summer 2023*
  Mathematics Department
- President, Math Club *Fall 2021 - Summer 2022*
  Mathematics Department
- Organizer:
  - Undergraduate Math Course Information Session *November 2022, April 2023*
  - Graduate School Student Panel *April 2022*
  - Undergraduate Math Research Student Panel *January 2022*

Teaching

At Pennsylvania State University:

- Instructor, MATH 41: Trigonometry and Analytic Geometry *Fall 2024, Fall 2025*

At Northeastern University:

- Teaching Assistant, MATH 4555: Complex Variables *Spring 2022 - Spring 2023*
- Grader, MATH 3150: Real Analysis *Fall 2022*
- Grader, MATH 2331: Linear Algebra *Spring 2021*
- Grader, MATH 2321: Calculus 3 for Science and Engineering *Fall 2020*
- Undergraduate Teaching Fellow, MATH 1365: Intro to Math Reasoning *Fall 2020*
- Peer Tutor, Math Department *Summer 2018 - Spring 2022*

Other:

- Substitute Teacher
  Salem School District, Salem NH

Work Experience

Distribution Analytics Co-op *July 2021 - January 2022*
John Hancock Insurance, Boston MA
Automated and improved processes to identify insurance applications process electronically, and developed several Tableau dashboards that allowed users to see profiles of specific insurance agents, with information such as client trends and sales potential.

Actuarial Analyst Co-op *July 2019 - December 2019*
Homesite Insurance, Boston MA
Proposed, developed, and presented to senior management multiple rate level adjustments for various insurance products based on analysis of historical state performance, and automated and developed templates to increase efficiency performance metrics.

Honors/Awards

University Graduate Fellow *Spring 2024*
Pennsylvania State University

Verne M. Willaman Distinguished Graduate Fellowship in Science *Fall 2023*
Pennsylvania State University

Outstanding Departmental Service Graduate Award *April 2023*
Northeastern University

Alberto Galmarino Award *May 2022*
Northeastern University
Awarded by the Math Department for service to the department.

Other

Summer Program Instructor, Salem NH School District *Summer 2024*
Organized and led a FIRST Lego League summer camp open to 4th and 5th grade students.

Academic Volunteer, SquashBusters *Fall 2017 - Spring 2022*
Assisted local Boston MA high school students with academic work and college preparation.

Lead Mentor, FIRST Robotics Competition Team 6324 *Fall 2017 - Fall 2019*
Mentored strategy and electrical sub-teams for a high school robotics team based in Salem NH.

Programming/Markup Languages
R, Python, SQL, Mathematica, MATLAB, LaTeX