Connor F. Lane

EDUCATION

Rose-Hulman Institute of Technology

Department of Mathematics – bachelor's in mathematics with minors in computer science and theoretical physics

- Degree expected Spring 2025, Program began Fall 2022
- Major GPA: 4.00   Cumulative GPA: 3.98

RESEARCH EXPERIENCE

Senior Thesis   (Fall 2024 – Current)

Rose-Hulman Institute of Technology – Terre Haute Indiana

- Researched p-adic L-functions and Iwasawa theory under Dr. Timothy All
- Learned advanced topics in algebraic number theory like Lubin-Tate theory and the main conjecture of Iwasawa theory

REU in Computational Number Theory   (Summer 2024)

Clemson University – Clemson South Carolina

- Studied Modular Forms under Dr. Hui Xue
- Proved identities involving Shimura lifts and Rankin-Cohen brackets
- Investigated elliptic curves over finite fields and arithmetic-geometric mean
- Completed two papers

Analysis of PDEs   (Fall 2023 – Current)

Rose-Hulman Institute of Technology – Terre Haute Indiana

- Studied PDEs under Dr. William Green
- Proved dispersive properties of the Dirac equation in 3D for massless particles and 4D massive particles.
- Paper accepted into Journal of Differential Equations

PREPRINTS AND PAPERS

AGM Aquariums and Elliptic Curves Over Arbitrary Finite Fields   (Oct 24 2024)

June Kayath, **Connor Lane,** *Ben Neifeld, Tianyu Ni, Hui Xue. "AGM Aquariums and Elliptic Curves Over Arbitrary Finite Fields" arXiv preprint arXiv:2410.17969. (2024)*

Subspaces Spanned by Eigenforms with Nonvanishing Central L-Values   (June 29 2024)

June Kayath, **Connor Lane,** *Ben Neifeld, Tianyu Ni, Hui Xue. "Subspaces Spanned by Eigenforms with Nonvanishing Central L-Values" arXiv preprint arXiv:2407.00532. (2024)*

The Massless Dirac Equation in Three Dimensions: Dispersive
Estimates and Zero Energy Obstructions   (February 12 2024)

*William R. Green, **Connor Lane,** Benjamin Lyons, Shyam Ravishankar, Aden Shaw. The massless Dirac equation in three dimensions: Dispersive estimates and zero energy obstructions, J. Differential Equations* **416** *(2025), 449--490; MR4806982*

Asymptotic Distribution of Residues in Pascal's Triangle mod p   (September 22 2023)

***Connor Lane**. "Asymptotic Distribution of Residues in Pascal's Triangle mod p" arXiv preprint arXiv:2309.12942 (2023)*

Remote Work: Fad or Future   (April 25, 2022)

*Aruni Chenxi, Nika Chuzhoy, Max Hartman, **Connor Lane**, and Nathan Liu "Remote Work: Fad or Future." Mathworks Math Modeling Challenge Runner-Up,* https://m3challenge.siam.org/resources/archives/2022-year-at-a-glance/2022-winningsolutions/ *(2022)*

TALKS GIVEN

- "AGM Aquariums and Elliptic Curves Over Finite Fields," Clemson University Undergraduate Research Symposium, July 26 2024
- "Cyclic Galois Extensions and Groups on Conics," Rose-Hulman Undergraduate Mathematics Conference 2024, April 27 2024
- "Asymptotic Distribution of Residues in Pascal's Triangle mod p," Joint Mathematics Meetings PME Undergraduate Poster Session, January 6 2024
- "Infinite Galois Theory," Ross Mathematics Program Dorm Lecture, July 15 2023
- "The Riemann Zeta Function and a Problem on my Shirt," Ross Mathematics Program Dorm Lecture, July 6 2023
- "Pascal's Triangle mod p," Rose-Hulman Undergraduate Mathematics Conference 2023, April 21 2023

TEACHING EXPERIENCE

Mathematics Grader   (Winter 2024 - Current)

Rose-Hulman Institute of Technology – Terre Haute Indiana

- Worked for the math department grading
- Graded real analysis and Galois theory

Mathematics Tutor   (Fall 2023 - Current)

Rose-Hulman Institute of Technology – Terre Haute Indiana

- Rose-Hulman Learning Center
- Tutored lower and upper-level mathematics classes
- Made resources and ran review session for Introduction to Proofs

Math program Counselor (Summer 2023)

Ross Mathematics Program – Terre Haute Indiana

- Taught gifted high school students elementary number theory
- Ran daily lessons for a group of six students

Private Mathematics and Computer Science Tutor (Winter 2021 – Spring 2022)

- Taught pre-algebra, algebra, and JavaScript to 5-8th grade students

Computer Science teaching intern (Summer 2019)

The Coder School – Highland Park Illinois

- Taught Python to grade school students

COURSEWORK – TOPICS COURSES

Étale Cohomology (MA 490) (Winter 2025)

Introduction to Etale Cohomology, Güter Tame

Introduction to Mathematical Logic (MA 490) (Winter 2025)

TBD

PDE Theory (MA 490)[1] (Winter 2025)

Partial Differential Equations, Lawrence Evans

Advanced Elliptic Curves (MA 490) (Fall 2024)

Arithmetic of Elliptic Curves, Joseph Silverman (Ch. 7-10)

Advanced Topics in the Arithmetic of Elliptic Curves, Joseph Silverman (Ch. 3,4)

ODE Theory (MA 490) (Fall 2024)

Differential Equations and Dynamical Systems, Lawrence Perko (Ch. 1-3)

Finite Simple Groups (MA 490) (Fall 2024)

The Finite Simple Groups, Robert Wilson

Scheme Theory II (MA 490)[2] (Spring 2024)

Algebraic Geometry I: Schemes, Gortz and Wedhorn (Ch. 5-9)

Functional Analysis (MA 460) (Spring 2024)

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[1] Took reading course but does not appear on transcript
[2] Took reading course but does not appear on transcript

Principles of Functional Analysis, Martin Schechter

Linear Algebra II (MA 471)   (Spring 2024)

Linear Algebra Done Right, Sheldon Axler

Scheme Theory (MA 490)   (Winter 2024)

Introduction to Schemes, Geir Ellingsrud, John Christian Ottem (Ch. 1-9)

Cohomology of Number Fields (MA 490)   (Winter 2024)

Cohomology of Number Fields, Jürgen Neukirch, Alexander Schmidt, Kay Wingberg (Ch. 9)

Various other textbooks, papers, and expository articles used

Differential Forms in Topology (MA 490)   (Winter 2024)

Differential Forms in Algebraic Topology, Raoul Bott, Loring W. Tu (Ch. 1-11, 13)

Arithmetic Geometry (MA 490)   (Fall 2023)

An Invitation to Arithmetic Geometry, Dino Lorenzini

Algebraic Topology (MA 461)   (Fall 2023)

Algebraic Topology, Allen Hatcher (Ch. 0-2)

p-adic Analysis (MA 490)   (Spring 2023)

Introduction to p-adic Analysis, Fernando Q. Gouvêa

Elliptic Curves and Applications (MA 478)   (Winter 2023)

Rational Points on Elliptic Curves, Joseph H. Silverman, John Tate (Ch. 1-5)

COURSEWORK – OTHER COURSES

Quantum Physics (PH 405)   (Winter 2025)

General Relativity (PH 410)   (Spring 2024)

Theory of Computation (CSSE/MA 474)   (Spring 2024)

Calculus of Variations (MA431)   (Spring 2024)

Programming Language Concepts (CSSE 304)   (Winter 2024)

Intermediate Microeconomics (ECON S251)   (Winter 2024)

Tensor Calculus (MA 421)   (Fall 2023)

Electric and Magnetic Fields (PH316)   (Fall 2023)

Special Relativity (PH310)   (Fall 2023)

Algorithm Design and Analysis (CSSE/MA 473)   (Spring 2023)

Probability and Statistics (MA381)   (Spring 2023)

Introduction to Proofs (MA276)   (Winter 2023)

Intermediate Macroeconomics (ECON S252)   (Winter 2023)

Differential Equations and Matrix Algebra II (MA222)   (Fall 2022)

ACADEMIC HONORS

- Goldwater Scholarship Winner, 2024 (Goldwater Foundation)
- Theodore Paine Palmer Award, 2023 (Rose-Hulman Institute of Technology)
- Dean's list, all quarters (Rose-Hulman Institute of Technology)

ACADEMIC COMPETITIONS

2023 William Lowell Putnam Mathematics Competition

- Top 200 Undergraduates in USA/Canada with score of 42/120

2022 William Lowell Putnam Mathematics Competition

- Top 200 Undergraduates in USA/Canada with score of 38/120

2022 MathWorks Math Modeling Challenge

- Member of 2nd place team in international competition
- Gave a presentation to a panel of mathematical modeling experts

SKILLS

- Typesetting software: LaTeX, TikZ
- Programming Languages: Java, JavaScript, Python (SageMath), Racket Scheme