Zachary Porat

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U.S. Citizen
Last Updated January 27, 2026

Education

Wesleyan University | Middletown, CT 2020 – Present

- Ph.D. Candidate in Mathematics (Expected 2026)
- Advisor: David Pollack

Union College | Schenectady, NY 2016 – 2020

- Bachelor of Science in Mathematics with Honors, *summa cum laude*
  - Honors Thesis: "Classification of Torsion Subgroups for Mordell Curves" [Link]
- Physics Minor, Phi Beta Kappa, Scholars Program

Research Interests

Broad: number theory, arithmetic geometry

Specific: automorphic forms, cohomology of arithmetic groups, arithmetic statistics, algebraic curves, computational aspects of number theory and arithmetic geometry

Publications and Preprints

[4] **Heuristics for (Ir)reducibility of p-Rank Strata of the Moduli Space of Hyperelliptic Curves** (with Thomas Bouchet, Erik Davis, Steven Groen, and Benjamin York), submitted. [Code]

arXiv:2506.06457

[3] **Computations Directly on the Cuspidal Cohomology of Congruence Subgroups of** $\mathrm{SL}(3,\mathbb{Z})$, *Mathematics of Computation* (2025). [Code]

DOI: 10.1090/mcom/4155

[2] **Family Sizes for Complete Multipartite Graphs** (with Danielle Gregg, Thomas Mattman, and George Todd), *Involve, a Journal of Mathematics*, Vol. 15, No. 4 (2022), 669-686.

MR4536581, DOI: 10.2140/involve.2022.15.669

[1] **PIXE Analysis of Synthetic Turf** (with Sajju Chalise, Morgan Clark, Skye Conlan, Scott LaBrake, and Michael Vineyard), *Environment and Ecology Research*, Vol. 6, No. 1 (2018), 60-65.

DOI: 10.13189/eer.2018.060105

Teaching Experience

Instructor of Record | Wesleyan University Fall 2022 – Present

- Math 500 - Graduate Pedagogy (Fall 2025)
- Math 121 - Calculus I (Fall 2024)
- Math 132 - Elementary Statistics (Fall 2022)

Teaching Assistant | Wesleyan University Fall 2021 – Present

- Math 221 - Vectors and Matrices (Spring 2026)
- Math 261 - Introduction to Abstract Algebra (Fall 2023, Fall 2025)
- Math 225 - Introduction to Real Analysis (Spring 2022, Spring 2023, Spring 2025)
- Math 262 - Advanced Topics in Abstract Algebra (Spring 2024)
- Math 228 - Discrete Mathematics (Fall 2021)

Math Workshop Tutor | Wesleyan University Fall 2020 – Spring 2021

- Covers the entire selection of undergraduate math courses at Wesleyan

Course Assistant | Union College Fall 2017 – Winter 2020

- Mth 340 - Linear Algebra (Winter 2020)
- Mth 110 - Calculus I (Fall 2017, Fall 2018, Fall 2019)
- Mth 112 - Calculus II (Winter 2018, Winter 2019)
- Mth 115 - Differential Vector Calculus and Matrix Theory (Spring 2018)

Calculus Help Center Tutor | Union College Fall 2019 – Winter 2020

- Covers Calculus I, Calculus II, and Multivariable Calculus with Linear Algebra

Mentorship and Outreach

Directed Reading Program Mentor | Wesleyan University Spring 2023 – Present

- William Allen, Elliptic Curves (Spring 2025)
  - Talk Title: "Elliptic Curve Cryptography: Data Encryption through Math"
- William Dollhopf, Mathematical Cryptography (Fall 2023)
  - Talk Title: "Introduction to Cryptography and the ElGamal Key Cryptosystem"
- Emily Bennett, Mathematical Cryptography (Spring 2023)
  - Talk Title: "Understanding Public Key Cryptography: The Diffie-Hellman Key Exchange"
- Stefan Hesseling, Mathematical Cryptography (Spring 2023)
  - Talk Title: "RSA and Integer Factorization"

Project Leader | Rethinking Number Theory June 22 – July 3, 2026

- Project Topic: Comparing a_p Values of Elliptic Curves Modulo ℓ [Link]

Project Assistant | Arithmetic Geometry at the University of North Texas May 5-9, 2025

- Course Title: "Iwasawa Theory and its Applications" [Link]

Mini-Course Lecturer | Student Workshop in Mathematics March 29-30, 2025

- Course Title: "A Crash Course in Cryptology: Securing Electronic Communications" [Link]

Invited Talks

- **Computations on the Cuspidal Cohomology of Congruence Subgroups of** $\mathrm{SL}(3,\mathbb{Z})$
  Five College Number Theory Seminar - February 10, 2026
- **On the Cuspidal Cohomology of Congruence Subgroups of** $\mathrm{SL}(3,\mathbb{Z})$
  Wesleyan Algebra and Number Theory Seminar - February 6, 2026
- **On the Cuspidal Cohomology of Congruence Subgroups of** $\mathrm{SL}(3,\mathbb{Z})$
  UConn Algebra Seminar - December 3, 2025
- **Computations on the Cohomology of Iwahori Congruence Subgroups of** $\mathrm{SL}(3,\mathbb{Z})$
  Special Session on Unveiling Connections: Number Theory Meets Algebraic Geometry
  AMS Fall Eastern Sectional Meeting (Virtual) - October 25, 2025
- **Computations on the Cohomology of Iwahori Subgroups of** $\mathrm{SL}(3,\mathbb{Z})$
  Special Session on Modular Forms in Combinatorics and Number Theory
  AMS Fall Southeastern Sectional Meeting (Tulane University) - October 4, 2025
- **Heuristics for (Ir)reducibility of Strata of the Moduli Space of Hyperelliptic Curves**
  Special Session on Curves and Abelian Varieties in Characteristic p
  AWM Research Symposium (University of Wisconsin-Madison) - May 16, 2025
- **The Evolving Role of Computers in Mathematics**
  AMS New England Graduate Student Conference (Brown University) - April 19, 2025
- **How Computers are Shaping Math**
  Manhattan College Math Seminar - November 15, 2023
- **The Search for Large Prime Numbers**
  Union College Math Seminar - January 12, 2023

Contributed Talks

- **Computing the Hecke Action Directly on the Cuspidal Cohomology of Congruence Subgroups of** $\mathrm{SL}(3,\mathbb{Z})$
  33èmes Journées Arithmétiques (Université du Luxembourg) - July 4, 2025
- **Advances in Computations on the Cohomology of Congruence Subgroups of** $\mathrm{SL}(3,\mathbb{Z})$
  37^{th} Automorphic Forms Workshop (University of North Texas) - May 4, 2025

- **Computations Directly on the Cuspidal Cohomology of Congruence Subgroups of** $\mathrm{SL}(3,\mathbb{Z})$
  Conférence de Théorie des Nombres Québec-Maine (Université Laval) - October 6, 2024
- **Additional Computations of the Hecke Action on the Cuspidal Cohomology of Congruence Subgroups of** $\mathrm{SL}(3,\mathbb{Z})$
  36^{th} Automorphic Forms Workshop (Oklahoma State University) - May 24, 2024
- **Death at 20: The Story and Math of Évariste Galois**
  Graduate Student Seminar (Wesleyan University) - March 9, 2023
- **An Introduction to Elliptic Curves**
  Graduate Student Seminar (Wesleyan University) - October 14, 2021

Select Workshops and Conferences

- **Arizona Winter School: Computational Aspects of Arithmetic Geometry and Cryptography** (University of Arizona), March 7-11, 2026.
- **AMS Fall Eastern Sectional Meeting**, Special Session on Unveiling Connections: Number Theory Meets Algebraic Geometry (Virtual), October 25-26, 2025.
- **AMS Fall Southeastern Sectional Meeting**, Special Session on Modular Forms in Combinatorics and Number Theory (Tulane University), October 3-5, 2025.
- **LMFDB, Computation, and Number Theory 2025** (ICERM), July 7-11, 2025.
- **33èmes Journées Arithmétiques** (Université du Luxembourg), June 30 – July 4, 2025.
- **AWM Research Symposium**, Special Session on Curves and Abelian Varieties in Characteristic p (University of Wisconsin-Madison), May 16-18, 2025.
- **Arithmetic Geometry at UNT**[†] (University of North Texas), May 5-9, 2025.
- **37^{th} Automorphic Forms Workshop** (University of North Texas), April 30 – May 4, 2025.
- **Conférence de Théorie des Nombres Québec-Maine** (Université Laval), October 5-6, 2024.
- **Algorithmic Number Theory Symposium XVI** (MIT), July 15-19, 2024.
- **36^{th} Automorphic Forms Workshop** (Oklahoma State University), May 20-24, 2024.
- **Arizona Winter School: Abelian Varieties** (University of Arizona), March 2-6, 2024.

Service

- Co-organizer of the Wesleyan Directed Reading Program — Spring 2023 – Present
- President of the Wesleyan AMS Graduate Student Chapter — Fall 2023 – Spring 2025
- Co-organizer of the 2025 Student Workshop in Mathematics [Link] — Spring 2025

[†]Denotes that I served as a project assistant at this workshop. See Mentorship and Outreach for additional details.

- Co-organizer of the Wesleyan Graduate Student Seminar — Spring 2022 – Fall 2023
- Vice President of the Wesleyan AMS Graduate Student Chapter — Fall 2021 – Spring 2023

Grants

- AMS Sectional Travel Grant — October 2025
- AWM Research Symposium Travel Grant — May 2025

Honors and Awards

- Martin Terry Resch Prize [Link] — May 2020
- Phi Beta Kappa Membership — May 2020
- Pi Mu Epsilon Membership — April 2019

Technical Skills

- Magma, SageMath, Python, Linux

References

Research

- **David Pollack**, dpollack@wesleyan.edu
  Associate Professor of Mathematics, Wesleyan University
- **Avner Ash**, ashav@bc.edu
  Professor of Mathematics, Boston College
- **Chris Williams**, chris.williams1@nottingham.ac.uk
  Assistant Professor of Pure Mathematics, University of Nottingham

Teaching

- **Alex Kruckman**, akruckman@wesleyan.edu
  Assistant Professor of Mathematics, Wesleyan University
- **Felipe Ramírez**, framirez@wesleyan.edu
  Associate Professor of Mathematics, Wesleyan University