Zachary Porat

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🌐 U.S. Citizen
🗓 Last Updated May 18, 2025

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
- Physics Minor, Phi Beta Kappa, Scholars Program

RESEARCH INTERESTS

Broad: number theory, arithmetic geometry

Specific: automorphic forms, cohomology of congruence subgroups of $SL(3, \mathbb{Z})$, computational aspects of number theory and arithmetic geometry

PUBLICATIONS AND PREPRINTS

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

   🔗 arXiv:2410.02734

[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 121 - Calculus I (Fall 2024)
- MATH 132 - Elementary Statistics (Fall 2022)

Graduate Teaching Assistant | WESLEYAN UNIVERSITY   Fall 2021 – Present
- MATH 225 - Introduction to Real Analysis (Spring 2022, Spring 2023, Spring 2025)
- MATH 262 - Advanced Topics in Abstract Algebra (Spring 2024)
- MATH 261 - Introduction to Abstract Algebra (Fall 2023)
- 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 Assistant | ARITHMETIC GEOMETRY AT UNT   May 5-9, 2025
- Course Title: Iwasawa Theory and its Applications

Mini-Course Lecturer | STUDENT WORKSHOP IN MATHEMATICS   March 29-30, 2025
- Course Title: A Crash Course in Cryptology: Securing Electronic Communications

INVITED TALKS

- **Heuristics for (Ir)reducibility of Strata of the Moduli Space of Hyperelliptic Curves**
  AWM Research Symposium: Special Session on Curves and Abelian Varieties in Characteristic p (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

- **Computations Directly on the Cuspidal Cohomology of Congruence Subgroups of** $SL(3, \mathbb{Z})$
  33èmes Journées Arithmétiques (Université du Luxembourg) | Upcoming

- **Advances in Computations on the Cohomology of Congruence Subgroups of** $SL(3, \mathbb{Z})$
  37th Automorphic Forms Workshop (University of North Texas) | May 4, 2025

- **Computations Directly on the Cuspidal Cohomology of Congruence Subgroups of** $SL(3, \mathbb{Z})$
  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** $SL(3, \mathbb{Z})$
  36th 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

- **LMFDB, Computation, and Number Theory 2025** (ICERM), Upcoming.

- **33èmes Journées Arithmétiques** (Université du Luxembourg), Upcoming.

- **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.

- **37th 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.

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

- **Algorithmic Number Theory Symposium XVI** (MIT), July 15-19, 2024.
- **36th 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 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 — Spring 2025
- Co-organizer of the departmental Graduate Student Seminar — Spring 2022 – Fall 2023
- Vice President of the Wesleyan AMS Graduate Student Chapter — Fall 2021 – Spring 2023

HONORS AND AWARDS

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

TECHNICAL SKILLS

- Magma, SageMath, Python

REFERENCES

Research
- David Pollack, dpollack@wesleyan.edu

Teaching
- Alex Kruckman, akruckman@wesleyan.edu
- Felipe Ramírez, framirez@wesleyan.edu