

Max Weinreich, Ph.D.

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RESEARCH INTERESTS

I work in algebraic dynamics, the intersection of algebraic geometry and dynamical systems. I use methods from moduli space theory, mathematical physics, integrable systems, and arithmetic geometry to explore classical dynamical systems from an algebraic viewpoint. My recent work is on billiards and dynamical degrees.

EMPLOYMENT

FALL 2022–	NSF Postdoctoral Researcher Harvard University, Cambridge, MA Mathematical Sciences Postdoctoral Research Fellowship NSF Supervisor: Laura DeMarco
	Lecturer (simultaneous appointment, 2023–25) Harvard University, Cambridge, MA

EDUCATION

2022	Ph.D in Mathematics , Brown University, Providence, RI Advisor: Joseph H. Silverman THESIS: <i>Algebraic dynamics, moduli spaces, and integrability.</i>
2019	M.S. in Mathematics , Brown University, Providence, RI
2016	B.A. in Mathematics, intensive , Yale University, New Haven, CT Cum laude; Distinction in the Major

PUBLICATION LIST

- [Algebraic billiards in the Fermat hyperbola.](#)
Preprint, 2024, submitted for publication. 34 pages.
- [The dynamical degree of billiards in an algebraic curve.](#)
To appear in **Journal of Geometric Analysis**, 49 pages.
- [GIT stability of linear maps on projective space with marked points.](#)
To appear in **Illinois J. Math.**, 39 pages.
- [Dynamical moduli spaces and polynomial endomorphisms of configurations.](#)
With Talia Blum, John Doyle, Trevor Hyde, Colby Kelln, and Henry Talbott. **Arnold Math. J.**, 8 (2022), no. 2, 285–317.
- [The algebraic dynamics of the pentagram map.](#)
Ergodic Theory & Dynamical Systems 43 (2023), no. 10, 3460–3505.
- [Automorphism groups of endomorphisms of \$\mathbb{P}^1\(\overline{\mathbb{F}}_p\)\$.](#)
With Julia Cai, Benjamin Hutz, and Leo Mayer. **Glasgow Math. J.** 65 (2023), no. 1, 222–255.

Updated October 18, 2024.

1. [Counting Arcs in Projective Planes via Glynn’s Algorithm.](#)

With Nathan Kaplan, Susie Kimport, Rachel Lawrence, and Luke Peilen. **J. Geom.** 108 (2017), no. 3, 1013–1029.

TEACHING

Instructor/Lecturer

2025 | Dynamical Systems, Harvard (undergraduate, spring, anticipating 30 students).

2024 | Entropy, Harvard (graduate, spring, 6 students, course of own design).

Real Analysis, Harvard (undergraduate, fall, 60 students, oversee 7 CAs).

2023 | Multivariable Calculus, Harvard (undergraduate, fall, 20 students, oversee 2 CAs).

2020 | Calculus II, Brown (undergraduate, spring, 30 students).

Teaching Assistant

2019 | Calculus II, Brown (undergraduate, fall, 60 students in 2 sections).

2018 | College Algebra, CCRI at RIDOC State Prison (undergraduate, fall, 20 incarcerated students).

Professional

2016–17 | Full-time mathematics tutor, grades 6–12, Praxis Tutors, NY

FELLOWSHIPS

2022–25 | **NSF Mathematical Sciences Postdoctoral Research Fellowship**
(*Grant No. 2202752*)

2017–22 | **NSF Graduate Research Fellowship**
(*Grant No. 2040433*)

ADVISING AND SERVICE

Research Mentoring

2024 | Undergraduate thesis advising (1 student).

2023 | Project Assistant (Arizona Winter School, 12 graduate students).

2019 | Research Teaching Assistant (Summer@ICERM REU, 5 students).

Leadership

- 2022 | Chair of bargaining committee, Graduate Labor Organization (Brown).
| Member of grievance committee, Graduate Labor Organization.
- 2021-22 | Lead Organizer for Physical Sciences, Graduate Labor Organization.
- 2019-20 | Elected member of bargaining committee, Graduate Labor Organization.

Conference and Seminar Organizing

- 2023-24 | Algebraic Dynamics Seminar, co-organizer, Harvard University.
- 2023 | Joint Mathematics Meetings special session, co-organizer, Boston.
- 2021 | Moduli space virtual seminar, co-organizer.
- 2020 | Algebra and Number Theory Seminar, co-organizer, Brown University.
| Graduate Student Seminar, organizer, Brown University.
| Arithmetic dynamics reading group, organizer, Brown University.
- 2019 | Graduate Student Seminar, webmaster, Brown University.
- 2018 | AMS Student Conferences (3 total), co-organizer, Brown University.

Outreach

- 2019 | Graduate student panel, Summer@ICERM Computational Arithmetic
Dynamics REU
- 2018 | Prison teaching: see Teaching section, above.
- 2018 | Talk at Ennead Architects Geometry Club.

INVITED TALKS AND LECTURES

- OCTOBER 2024 **Quebec-Maine Number Theory Conference**, Université Laval.
- APRIL 2024 **Algebra and Number Theory Seminar**, University of Rochester.
- APRIL 2024 **Dynamics Seminar**, University of Rochester.
- APRIL 2024 **Algebra and Number Theory Seminar**, Brown University.
- APRIL 2024 **Algebraic Dynamics Seminar**, Harvard University.
- FEBRUARY 2024 **Algebraic Geometry in String Theory Seminar**, Harvard University.
- DECEMBER 2023 **Semester on Mathematical Billiards**, Simons Center for Geometry and Physics, Stony Brook.
- NOVEMBER 2023 **Algebraic Geometry Seminar**, University of Notre Dame.
- NOVEMBER 2023 **Unlikely Intersections Seminar**, University of Illinois Chicago.
- JULY 2023 **Algebraic Dynamics Seminar**, Harvard University.
- MAY 2023 **Algebraic Geometry Seminar**, University of Milan.
- FEBRUARY 2023 **Algebraic Geometry Seminar**, Boston College.
- JANUARY 2023 **Special Session on Recent Advances in Arithmetic Dynamics I**, Joint Mathematics Meetings, Boston, MA.
- NOVEMBER 2022 **Algebraic Dynamics Seminar**, Harvard University.
- NOVEMBER 2022 **Number Theory Seminar**, Amherst College.
- OCTOBER 2022 **Arithmetic Dynamics Special Session**, AMS Western Sectional Meeting.

SEPTEMBER 2022 **Geometry and Dynamics Seminar**, Tufts University.
 SEPTEMBER 2022 **Algebra, Geometry, and Number Theory Seminar**, Leiden University (online).
 SEPTEMBER 2022 **Algebraic Geometry Seminar**, Harvard-MIT.
 MAY 2022 **Algebraic Dynamics Workshop**, Harvard University.
 APRIL 2022 **Joint Math-Physics Seminar**, University of Pennsylvania.
 FEBRUARY 2022 **Moduli Across the Pandemic**, Boston College, online.
 NOVEMBER 2021 **Algebra Seminar**, Brown University.
 NOVEMBER 2021 **BUGCAT: Binghamton University Graduate Combinatorics, Algebra, and Topology**.
 OCTOBER 2021 **AGNES: Algebraic Geometry Northeastern Series**, Boston College.
 OCTOBER 2021 **Geometry-Topology Seminar**, Brown University.
 AUGUST 2021 **Algebraic Dynamics Seminar**, Harvard University, online.
 APRIL 2021 **Hamiltonian Systems Seminar**, University of Arizona / University of Toronto, online.
 MARCH 2021 **Graduate Number Theory Seminar**, Rutgers University, online.
 OCTOBER 2020 **Algebra Seminar**, Brown University, online.
 APRIL 2020 **Graduate Number Theory Seminar**, Rutgers University, online.

TECH

Expertise in: LaTeX, Python, Sage, C-Sharp, Unity3D, Processing