

Derek Garton

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Employment

Associate Professor, [Portland State University](#), 2019–present
Adjunct staff member (summers), [Center for Communications Research](#) 2023–present
Assistant Professor, [Portland State University](#), 2013–2019
Postdoctoral Lecturer, [Northwestern University](#), 2012–2013

Education

PhD Mathematics, [University of Wisconsin–Madison](#), 2012
Dissertation: *Random matrices and Cohen-Lenstra statistics for global fields with roots of unity*
Advisor: [Jordan Ellenberg](#)
MS Mathematics, [Portland State University](#), 2006
Maîtrise de Mathématiques (mention bien), [Université Pierre et Marie Curie](#), 2003
BA French, Mathematics, Music (magna cum laude), [Whitman College](#), 2001

Research interests

Number theory, arithmetic statistics, arithmetic geometry, arithmetic dynamics, Galois theory, finite fields, function fields, random matrices

Publications

The distribution of α -numbers of hyperelliptic curves in characteristic three,
with Jeffrey Lin Thunder and Colin Weir.
(Submitted for publication.)

Periodic points of rational functions of large degree over finite fields.
(Submitted for publication.)

Preperiodic points of polynomial dynamical systems over finite fields,
with Aaron Andersen.
(To appear in the [International Journal of Number Theory](#).)

Periodic points of polynomials over finite fields.
Trans. Amer. Math. Soc. **375** (2022), no. 7, 4849–4871. (Here is [the arXiv version](#).)

The cycle structure of unicritical polynomials,
with Andrew Bridy.
Int. Math. Res. Not. (2020), no. 23, 9120–9147. (Here is [the arXiv version](#).)

A probabilistic heuristic for counting components of functional graphs of polynomials over finite fields,
with Elisa Bellah¹, Erin Tannenbaum¹, and Noah Walton¹.
Involve **11** (2018), no. 11, 169–179. (Here is [the arXiv version](#).)

Dynamically distinguishing polynomials,
with Andrew Bridy.
Res. Math. Sci. **4** (2017), no. 13, 1–17. (Here is [the arXiv version](#).)

A weighted Möbius function.
Discrete Math. **340** (2017), no. 9, 2200–2207. (Here is [the arXiv version](#).)

Some finite abelian group theory and some q -series identities.
Ann. Comb. **20** (2016), no. 2, 361–371. (Here is [the arXiv version](#).)

Random matrices, the Cohen-Lenstra heuristics, and roots of unity.
Algebra Number Theory **9** (2015), no. 1, 149–171. (Here is [the arXiv version](#).)

Abelian surfaces over finite fields with prescribed groups,
with Chantal David, Zachary Scherr, Arul Shankar, Ethan Smith, and Lola Thompson.
Bull. London Math. Soc. **46** (2014), no. 4, 779–792. (Here is [the arXiv version](#).)

Graph components and dynamics over finite fields,
with Ryan Flynn.
Int. J. Number Theory **10** (2014), no. 3, 779–792. (Here is [the arXiv version](#).)

The a -numbers of Jacobians of Suzuki curves,
with Holley Friedlander, Beth Malmskog, Rachel Pries, and Colin Weir.
Proc. Amer. Math. Soc. **141** (2013), 3019–3028. (Here is [the arXiv version](#).)

Graduate Students

Anne Adams (MS Mathematics, 2020)
Holly Brewster (MS Mathematics, 2020)
Edward James (MS Mathematics, 2020)
Aidan Hill (MS Mathematics, 2020)
Jaxon Shumaker (MS Mathematics, 2019)
Madilyn Marshall (MS Mathematics, 2018)
Erin Tannenbaum (MS Mathematics, 2018)
Ronni Atchley (MS Mathematics, 2015)
Joseph Wooster (MS Mathematics, 2015)

Teaching experience

[Portland State University](#), 2013–present

Math 253, Calculus III (Fall 2016)
Math 261, Introduction to Linear Algebra (Winter 2014, Fall 2019)
Math 300, Introduction to Mathematical Reasoning (Fall 2015, Fall 2017)
Math 344, Introduction to Group Theory and Applications (Spring 2017, Winter 2018,
Fall 2018, Spring 2020, Fall 2021,
Fall 2023, Spring 2024)

¹ Undergraduate researcher.

Math 346, Number Theory (Fall 2013, Winter 2014, Winter 2015, Fall 2015, Fall 2021, Winter 2022, Fall 2022, Winter 2024)
Math 356, Discrete Mathematics (Winter 2022, Winter 2023)
Math 410/510, Introduction to Algebraic Number Theory² (Winter 2016–Spring 2016, Winter 2019–Spring 2019, Fall 2023–Winter 2024)
Math 441–3/541–3, Introduction to Abstract Algebra I,II,III (Fall 2016–Winter 2017, Fall 2018–Spring 2019, Spring 2023)
Math 444/544, Advanced Linear and Multilinear Algebra I (Winter 2020, Spring 2022)
Math 449/549, Advanced Number Theory (Spring 2014)
Math 505/605, Independent Study in Advanced Number Theory (five students, Fall 2014)
Math 610, Introduction to Algebraic Geometry I,II,III² (Fall 2017–Spring 2018)
Math 641–3, Modern Algebra I,II,III (Fall 2014–Spring 2015, Fall 2019–Spring 2020, Spring 2022, Fall 2022–Spring 2023, Spring 2024)

[Northwestern University](#), 2012–2013

Math 230, Differential Calculus of Multivariable Functions (Fall 2012, Winter 2013, and Spring 2013)
Math 240, Linear Algebra (Winter 2013 and Spring 2013)

Grants and fellowships

[NSA Grant Oregon Number Theory Days](#) (2021–2023)

[NSF Grant Collaborative Research: Oregon Number Theory Days](#) (2017–2020)

[Pacific Institute for the Mathematical Sciences Grant Oregon Number Theory Days](#) (2017–2020)

[Mathematics Research Communities Additional Collaboration Grant](#) (Winter 2013)

[ICERM Graduate Student Fellow](#) (Spring 2012)

[NSF-RTG Fellow](#) (Spring 2010–Summer 2010, Spring 2011–Summer 2011)

VIGRE Merit Based Fellowships (Summer 2008, Summer 2009)

Awards

Named “Most Influential Person” by Regeneron Scholar Alec Leng (Winter 2017)

Mentored Noah Walton, [first place at the Sigma Xi Student Research Symposium](#) (Fall 2016)

[The John Eliot Allen Outstanding Teaching Award](#) (Spring 2015)

University of Wisconsin–Madison Capstone PhD Teaching Award (Fall 2011)

[University of Wisconsin–Honored Instructors Award](#) (Spring 2009)

²New course developed at Portland State University.

Professional service

Co-organizer, [Oregon Number Theory Days](#) (Fall 2017–present)

Co-organizer and frequent presenter, [Portland State University Combinatorics and Number Theory Seminar](#) (Fall 2013–present)

Academic Sponsor, [Mathematical Sciences Research Institute \(MSRI\)](#) (Fall 2018–Spring 2020)

Reviewer, [American Mathematical Society Mathematical Reviews](#) (Fall 2017–Spring 2020)

Referee, [American Mathematical Monthly](#), [Canadian Journal of Mathematics](#), [Discrete Mathematics](#), [Finite Fields and Their Applications](#), [Journal of Number Theory](#), [Mathematics of Computation](#), [Monatshefte für Mathematik](#), [Proceedings of the American Mathematical Society](#), [Proceedings of the Edinburgh Mathematical Society](#), and [Research in Number Theory](#) (various dates)

Selected university and department service

Lead advisor, Master's Committee (Spring 2019–Spring 2020, and Fall 2021–present)

Member, Colloquium Committee (Fall 2013–Spring 2020, and Fall 2023–present³)

Member, University Budget Committee (Fall 2021–Spring 2024)

Chair, Diversity Committee (Fall 2022–Spring 2023)

Member, Departmental Election Committee (Fall 2022–Spring 2023)

Master of Ceremonies, Graduate Reception (Spring 2022)

Member, Diversity Committee (Winter 2020–Spring 2020, Fall 2021–Spring 2022)

Member, Research Reinvestment Course Release Committee (Fall 2021)

Member, [Portland State University Scholastic Standards Committee](#) (Fall 2015–Spring 2020)

Chair, Library Committee (Fall 2018–Spring 2019)

Faculty Mentor, [Portland State University Math Club](#) (Fall 2013–Spring 2018)

Community outreach

Mentor to Scott Dyleski, inmate at the California State Prison–Corcoran (Starting Fall 2021⁴)

Volunteer for the Oregon Invitational Mathematics Tournament Exam Committee (Spring 2019)

Interviewed by Sarah Sanborn, 7th grader at Cascade Heights public Charter school in Portland Oregon, about Emmy Noether (April 12, 2019)

Presented *What don't we know about π ?*, [Portland State University SIAM Club](#) (March 14, 2019)

³Chair, Fall 2015–Spring 2018 and Fall 2023–present.

⁴Mr. Dyleski has discovered an interest in mathematics while incarcerated.

Presented *The Pollard Rho algorithm and randomness in discrete dynamical systems* to the [Portland State University SIAM Club](#) (November 29, 2017)

Mentor to Antone Chacartegui, former inmate at the Idaho Correctional Institution–Orofino (Spring 2010–Spring 2017⁵)

Volunteer for the Oregon Invitational Mathematics Tournament Media Committee (Winter 2016)

Presented *Ideal class groups and the Cohen-Lenstra heuristics* to the [Oregon State University REU, Oregon State University](#) (July 22, 2015)

Presented *Isodynamicism, what is it?* to the [Portland State University Math Club, Portland State University](#) (April 2, 2015)

Presented *About a course in analytic number theory* at a Pi Mu Epsilon Meeting, [Portland State University](#) (December 5, 2014)

Presented *The Ternary Goldbach Conjecture* to the [Dead Mathematicians' Society, Mount Hood Community College](#) (November 19, 2013)

Volunteer for a Girl Scout afternoon of mathematics (Spring 2010)

Volunteer for the [Wisconsin MegaMath Meet](#) (Spring 2008, Spring 2009, Spring 2011, Spring 2012)

Volunteer for Sidewalk Math (Spring 2008 and Spring 2009)

Selected recent presentations

Periodic points of polynomials over finite fields, [Arithmetic Dynamics International Online Seminar](#), April 16, 2022.

Periodic points of polynomials over finite fields, [Washington State University Combinatorics, Linear Algebra, and Number Theory Seminar](#), April 11, 2022.

Statistics of a -numbers of hyperelliptic curves over finite fields, [University of Oregon Number Theory Seminar](#), May 28, 2019.

Statistics of a -numbers of hyperelliptic curves over finite fields, [Oregon State University Number Theory Seminar](#), May 14, 2019.

The randomness of polynomial dynamical systems over finite fields, [AMS Sectional Special Session on Arithmetic Dynamics](#), March 22, 2019.

The Pollard Rho algorithm and randomness in discrete dynamical systems, [Oregon State University Number Theory Seminar](#), February 6, 2018.

The Pollard Rho algorithm and randomness in polynomial maps, [2017 SIAM Pacific Northwest Conference](#), October 28, 2017.

Dynamically distinguishing polynomials, Number Theory Seminar, [UC–Irvine](#), February 28, 2017.

⁵During this period, Mr. Chacartegui was studying mathematics while incarcerated to prepare for university studies upon his release. He is now earning a Master's Degree at Boise State University.

Dynamically distinguishing polynomials, [Mathematics Colloquium](#), [Willamette University](#), February 8, 2017.

Dieudonné modules and the Cohen-Lenstra heuristics, [Pacific Northwest Number Theory Conference](#), May 15, 2016.

Random matrices and Cohen-Lenstra-Martinet heuristics for function fields, Number Theory Seminar, [University of Oregon](#), May 26, 2015.

Diophantine equations and ideal class groups, [Mathematics Colloquium](#), [Lewis & Clark University](#), November 12, 2014.

Random Dieudonné Modules and the Cohen-Lenstra heuristics, [Statistics and Number Theory Workshop](#), [Centre de Recherches Mathématiques](#), September 15, 2014.

Random matrices and Cohen-Lenstra distributions in function fields, [Number Theory Seminar](#), [Oregon State University](#), November 15, 2013.

Random matrices and Cohen-Lenstra distributions in function fields, [SIAM Conference on Applied Algebraic Geometry](#), August 3, 2013.

Statistics of ideal class groups, [Mathematics Colloquium](#), [Western Illinois University](#), April 4, 2013.

Random matrices and the Cohen-Lenstra-Martinet heuristics, [Number Theory Seminar](#), [University of Illinois–Chicago](#), March 12, 2013.

Random matrices and the Cohen-Lenstra-Martinet heuristics, Number Theory Seminar, [Northwestern University](#), January 28, 2013.

The Cohen-Lenstra heuristics, roots of unity, and random matrices, Mathematics Research Communities [Program on Arithmetic Statistics](#), Snowbird, UT, June 26, 2012.

A survey of results on commuting polynomials in positive characteristic (with [Andrew Bridy](#) and [Zachary Scherr](#)), [Program on “Complex and Arithmetic Dynamics”](#), [ICERM](#), May 3, 2012.

Averages for polynomial maps over finite fields, [Program on “Complex and Arithmetic Dynamics”](#), [ICERM](#), January 31, 2012.

The Cohen-Lenstra heuristics, roots of unity, and random matrices, [2012 Joint Mathematical Meetings](#), Boston, MA, January 6, 2012.

Factoring, random maps, and polynomial maps, [Midwest Number Theory Conference for Graduate Students XI](#), [University of Wisconsin–Madison](#), November 19, 2011.

The Cohen-Lenstra heuristics, roots of unity, and random matrices, [Workshop on the Cohen-Lenstra heuristics for class groups](#), [The American Institute of Mathematics](#), June 15, 2011.

The Cohen-Lenstra heuristics and random matrices, [Midwest Number Theory Conference for Graduate Students X](#), [University of Michigan](#), November 13, 2010.

Graph components and dynamics over finite fields, [Arizona Winter School](#), Tucson, AZ, March 17, 2010.