

John R. Doyle

Curriculum Vitæ

Contact Information

Updated: Jan 2026

Mathematical Sciences 530 / 402A (admin)
Department of Mathematics
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Education

Ph.D., Mathematics, University of Georgia May 2014
Advisor: Robert Rumely
Dissertation: *Dynamics of quadratic polynomials over quadratic fields*

M.A., Mathematics, University of Georgia Dec 2010

B.S., Mathematics, University of Georgia May 2008
Summa cum laude, with highest honors
Minor: Spanish

Employment

Associate Department Head, Oklahoma State University 2026–

Associate Professor, Oklahoma State University 2024–

Assistant Professor, Oklahoma State University 2020–2024

Assistant Professor, Louisiana Tech University 2017–2020

Visiting Assistant Professor, University of Rochester 2014–2017

Graduate Teaching Assistant, University of Georgia 2008–2014

Research Interests

Arithmetic dynamics, algebraic number theory, arithmetic geometry

Publications and Preprints

- [27] John R. Doyle and Alexander Galarraga. *Cubic points on dynamical modular curves*. Preprint. [arXiv:2511.11491](https://arxiv.org/abs/2511.11491)
- [26] John R. Doyle and Wade Hindes. *Preperiodic integers for $x^d + c$ in large degree*. Preprint. [arXiv:2510.14067](https://arxiv.org/abs/2510.14067)
- [25] John R. Doyle and Wade Hindes. *Unicritical polynomials over abc-fields: from uniform boundedness to dynamical Galois groups*. Preprint. [arXiv:2408.14657](https://arxiv.org/abs/2408.14657)
- [24] John R. Doyle, Paul Fili, and Bella Tobin. *Stochastic equidistribution and generalized adelic measures*. Preprint. [arXiv:2111.08905](https://arxiv.org/abs/2111.08905)
- [23] John R. Doyle and Trevor Hyde. *Polynomials with many rational preperiodic points*. *Trans. Amer. Math. Soc.* **378** (2025), no. 8, 5981–6011.
- [22] John R. Doyle and Alex Rice. *The Furstenberg-Sárközy theorem for polynomials in one or more prime variables*. *Ramanujan J.* **67** (2025), no. 3, 64, 33pp.

- [21] John R. Doyle and David Krumm. *Quadratic points on dynamical modular curves*. Res. Number Theory **10** (2024), 10:59, 32pp.
- [20] John R. Doyle, Vivian Olsiewski Healey, Wade Hindes, and Rafe Jones. *Galois groups and prime divisors in random quadratic sequences*. Math. Proc. Cambridge Philos. Soc. **176** (2024), no. 1, 95–122.
- [19] John R. Doyle and Xander Faber. *New families satisfying the dynamical uniform boundedness principle over function fields*. Math. Ann. **388** (2024), 985–1000.
- [18] John R. Doyle, Paul Fili, and Trevor Hyde. *Dynatomic polynomials, necklace operators, and universal relations for dynamical units*. New York J. Math. **28** (2022), 534–556.
- [17] Talia Blum, John R. Doyle, Trevor Hyde, Colby Kelln, Henry Talbott, and Max Weinreich. *Dynamical moduli spaces and polynomial endomorphisms of configurations*. Arnold Math. J. **8** (2022), 285–317.
- [16] John R. Doyle and Alex Rice. *Multivariate polynomial values in difference sets*. Discrete Anal. 2021:11, 46 pp.
- [15] Andrew Bridy, John R. Doyle, Dragos Ghioca, Liang-Chung Hsia, and Thomas J. Tucker. *A question for iterated Galois groups in arithmetic dynamics*. Canad. Math. Bull. **64** (2021), no. 2, 401–417.
- [14] Andrew Bridy, John R. Doyle, Dragos Ghioca, Liang-Chung Hsia, and Thomas J. Tucker. *Finite index theorems for iterated Galois groups of unicritical polynomials*. Trans. Amer. Math. Soc. **374** (2021), no. 1, 733–752.
- [13] John R. Doyle and Joseph H. Silverman. *Moduli spaces for dynamical systems with portraits*. Illinois J. Math. **64** (2020), no. 3, 375–465.
- [12] John R. Doyle. *Preperiodic points for quadratic polynomials over cyclotomic quadratic fields*. Acta Arith. **196** (2020), no. 3, 219–268.
- [11] John R. Doyle and Bjorn Poonen. *Gonality of dynatomic curves and strong uniform boundedness of preperiodic points*. Compos. Math. **156** (2020), 733–743.
- [10] John R. Doyle and Joseph H. Silverman. *A uniform field-of-definition/field-of-moduli bound for dynamical systems on \mathbb{P}^N* . J. Number Theory **195** (2019), 1–22.
- [9] John R. Doyle. *Dynamical modular curves for quadratic polynomial maps*. Trans. Amer. Math. Soc. **371** (2019), no. 8, 5655–5685.
- [8] John R. Doyle, Holly Krieger, Andrew Obus, Rachel Pries, Simon Rubinstein-Salzedo, and Lloyd West. *Reduction of dynatomic curves*. Ergodic Theory Dynam. Systems **39** (2019), no. 10, 2717–2768.
- [7] John R. Doyle. *Preperiodic points for quadratic polynomials with small cycles over quadratic fields*. Math. Z. **289** (2018), no. 1–2, 729–786.
- [6] John R. Doyle. *Preperiodic portraits for unicritical polynomials over a rational function field*. Trans. Amer. Math. Soc. **370** (2018), no. 5, 3265–3288.
- [5] John R. Doyle, Kenneth Jacobs, and Robert Rumely. *Configuration of the crucial set for a quadratic rational map*. Res. Number Theory **2** (2016), 2:11.
- [4] John R. Doyle. *Preperiodic portraits for unicritical polynomials*. Proc. Amer. Math. Soc. **144** (2016), no. 7, 2885–2899.
- [3] John R. Doyle and David Krumm. *Computing algebraic numbers of bounded height*. Math. Comp. **84** (2015), no. 296, 2867–2891.
- [2] John R. Doyle, Xander Faber, and David Krumm. *Preperiodic points for quadratic polynomials over quadratic fields*. New York J. Math. **20** (2014), 507–605.
- [1] Michael Ching and John R. Doyle. *Apollonian circle packings of the half-plane*. J. Comb. **3** (2012), no. 1, 1–48.

Invited Talks

<i>Cubic points on dynamical modular curves</i> , AMS Fall Central Sectional, Special Session on Algebraic and Arithmetic Dynamics, St. Louis, MO	Oct 19, 2025
<i>Uniform boundedness of preperiodic points for unicritical polynomials</i> , Joint Mathematics meetings, AMS Special Session on Arithmetic Dynamics of Single and Multiple Maps, Seattle, WA	Jan 8, 2025
<i>The dynamical uniform boundedness principle over function fields</i> , AMS Fall Central Sectional, Special Session on Non-Archimedean, Algebraic, Tropical Geometry and applications, San Antonio, TX	Sept 4, 2024
<i>The dynamical uniform boundedness principle over function fields</i> , AMS Fall Southeastern Sectional, Special Session on Number Theory and Friends, Mobile, AL	Oct 13, 2023
<i>Quadratic points on dynamical modular curves</i> , Joint Mathematics Meetings, AMS-AWM Special Session on Complex and Arithmetic Dynamical Systems, Boston, MA	Jan 4, 2023
<i>Families satisfying the dynamical uniform boundedness principle</i> , Five College Number Theory Seminar (virtual)	Mar 29, 2022
<i>The Mandelbrot Set: Dynamics, Analysis, Topology, and Combinatorics</i> , OSU Graduate Math Conference, Oklahoma State University	Mar 26, 2022
<i>Quadratic points on dynamical modular curves</i> , Oregon Number Theory Days, Portland State University	Oct 2, 2021
<i>Arithmetic and geometry of certain dynamical modular curves</i> , Arithmetic Dynamics International Online Seminar (ADIOS)	Sept 9, 2020
<i>Dynamical modular curves and uniform boundedness of preperiodic points</i> , Louisiana State University, Algebra and Number Theory Seminar	Mar 3, 2020
<i>Moduli spaces and uniform boundedness in arithmetic dynamics</i> , Oklahoma State University, Colloquium	Feb 3, 2020
<i>Moduli spaces for dynamical systems with level structure</i> , Joint Mathematics Meetings, AMS Special Session on Arithmetic Dynamics, Denver, CO	Jan 18, 2020
<i>Moduli spaces for dynamical systems</i> , Mini-Workshop on Arithmetic Dynamics, University of Calgary	Aug 21, 2019
<i>Finite index theorems for unicritical polynomials over function fields</i> , AMS Spring Central/Western Joint Sectional Meeting, Special Session on Arithmetic Dynamics	Mar 23, 2019
<i>Moduli spaces for dynamical systems with level structure</i> , University of Rochester, Algebra and Number Theory Seminar	Feb 27, 2019
<i>Preperiodic points in complex and arithmetic dynamics</i> , Reed College, Colloquium	Nov 1, 2018
<i>Dynamical modular curves and uniform boundedness of preperiodic points</i> , AMS Spring Eastern Sectional Meeting, Special Session on Arithmetic Dynamics	Apr 22, 2018
<i>Preperiodic points in complex and arithmetic dynamics</i> , Oklahoma State University, Colloquium	Mar 2, 2018
<i>Dynamical modular curves and uniform boundedness of preperiodic points</i> , Oklahoma State University, Number Theory Seminar	Mar 1, 2018
<i>Dynamical modular curves and strong uniform boundedness</i> , Brown University, Algebra Seminar	Nov 6, 2017

<i>Dynamical modular curves and strong uniform boundedness</i> , Texas A&M University, Number Theory Seminar	Nov 1, 2017
<i>Reduction of dynatomic curves</i> , Mathematical Congress of the Americas, Special Session on Arithmetic Dynamics	July 25, 2017
<i>Dynamical modular curves for quadratic polynomial maps</i> , University of Georgia, Potential Theory and Arithmetic Dynamics: A conference in honor of Robert Rumely	Mar 25, 2017
<i>Dynamical modular curves and applications</i> , University of South Alabama, Colloquium	Jan 31, 2017
<i>Dynamical modular curves for quadratic polynomial maps</i> , Joint Mathematics Meetings, AMS Special Session on Discrete Structures in Number Theory	Jan 5, 2017
<i>Preperiodic portraits for unicritical polynomials</i> , Oklahoma State University, Number Theory Seminar	Apr 21, 2015
<i>Preperiodic portraits for unicritical polynomials</i> , Binghamton University, Arithmetic Seminar	Mar 9, 2015
<i>Dynamical modular curves of small genus</i> , Claremont Center for the Mathematical Sciences, Algebra/Number Theory/Combinatorics seminar	Feb 18, 2014
<i>Preperiodic points for quadratic polynomials, II</i> , University of California, Riverside, AMS Western Fall Sectional Meeting	Nov 3, 2013
<i>Computing preperiodic graphs: toward an extension of Poonen's conjecture</i> , University of Georgia, Arithmetic Dynamics Summer School Program	May 16, 2011

Additional Presentations

<i>Dynamical systems</i> , Stillwater High School Math Club	Dec 15, 2023
<i>The Axiom of Choice</i> , Friends of the Forms (OSU student philosophy club)	Oct 4, 2023
<i>How Big is Infinity?</i> , OSU High School Math Day	Oct 3, 2023

Conferences and Workshops

Joint Mathematics Meetings, Seattle, WA	Jan 8–11, 2025
AMS Fall Central Sectional Meeting, San Antonio, TX	Sept 14–15, 2024
Joint Mathematics Meetings, San Francisco, CA	Jan 3–6, 2024
AMS Fall Southeastern Sectional Meeting, Mobile, AL	Oct 13–15, 2023
Joint Mathematics Meetings, Boston, MA	Jan 4–7, 2023
Equidistribution and Arithmetic Dynamics, Oklahoma State University	June 20–24, 2022
Oregon Number Theory Days, Portland State University	Oct 2, 2021
Moduli spaces for algebraic dynamical systems, AIM	Sept 27–Oct 1, 2021
Joint Mathematics Meetings, Virtual	Jan 6–9, 2021
Joint Mathematics Meetings, Denver, CO	Jan 15–18, 2020
Sage Days 104: Arithmetic Dynamics, Saint Louis University	Nov 17–20, 2019

Mini-Workshop on Arithmetic Dynamics, University of Calgary	Aug 19–23, 2019
AMS Spring Central/Western Joint Sectional Meeting, University of Hawai'i at Mānoa	Mar 22–24, 2019
Hawai'i Number Theory (HINT) 2019, University of Hawai'i at Mānoa	Mar 18–21, 2019
Gulf States Math Alliance Conference, University of Texas at Arlington	Feb 15–17, 2019
AMS Spring Eastern Sectional Meeting, Northeastern University	Apr 21–22, 2018
Joint Mathematics Meetings, San Diego, CA	Jan 9–13, 2018
Mathematical Congress of the Americas, Montréal, QC	July 24–28, 2017
Potential Theory and Arithmetic Dynamics: A conference in honor of Robert Rumely, University of Georgia	Mar 25–26, 2017
Joint Mathematics Meetings, Atlanta, GA	Jan 4–7, 2017
The Galois theory of orbits in arithmetic dynamics, AIM	May 16–20, 2016
Upstate New York Number Theory Conference (VI), University of Rochester	Apr 30–May 1, 2016
RTG Workshop in Arithmetic Dynamics, University of Michigan	Dec 3–6, 2015
Arithmetic 2015: Silvermania, Brown University	Aug 11–15, 2015
Upstate New York Number Theory Conference (V), Cornell University	Apr 10–12, 2015
Joint Mathematics Meetings, Baltimore, MD	Jan 15–18, 2014
Sage Days 55: Arithmetic and Complex Dynamics, Florida Institute of Technology	Nov 7–10, 2013
AMS Fall Western Sectional Meeting, University of California, Riverside	Nov 2–3, 2013
Georgia Algebraic Geometry Symposium, University of Georgia	Oct 18–20, 2013
Complex Dynamics (and related areas), University of Illinois at Chicago	June 5–7, 2013
Palmetto Number Theory Series XVIII, Wake Forest University	Sept 15–16, 2012
Global Arithmetic Dynamics, ICERM	Mar 19–23, 2012
Palmetto Number Theory Series XVI, Emory University	Sept 10–11, 2011
Arithmetic Dynamics Summer School Program, University of Georgia	May 16–27, 2011

Conference Organization

AMS Special Session on Recent Advances in Arithmetic Dynamics (JMM) Organizers: <i>Jacqueline Anderson, John R. Doyle, Joseph H. Silverman</i>	Jan 6–7, 2023
Equidistribution and Arithmetic Dynamics, Oklahoma State University Organizers: <i>John R. Doyle, Paul Fili, Igor Pritsker</i>	June 20–24, 2022
AMS Special Session on Current Trends in Arithmetic Dynamics (JMM) Organizers: <i>John R. Doyle, Trevor Hyde, Michelle Manes</i>	Jan 9, 2021

Research Experience for Undergraduates

Summer@ICERM 2019: Computational Arithmetic Dynamics

Sum 2019

Mentored two student research groups: One group worked on problems involving rational preperiodic points for certain families of polynomial maps. The other group studied finite orbit sets for *semigroup* dynamical systems.

STUDENTS

Rational preperiodic points: Meghan Grip (U. Rochester), Emily Rachfal (Kenyon College), Olivia Schwager (Muhlenberg College), Matt Torrence (Gettysburg College)

Semigroup dynamics: Talia Blum (MIT), Colby Kelln (U. Michigan), Henry Talbott (Brown U.)

Students Advised

Oklahoma State University

Mohammed Almutarrid (Ph.D.)	[Current]
Anshada Pattambi Muhammedali (Ph.D.)	[Current]
Kaedyn Wright (MS)	Sum 2025
Logan Caughlin (MS)	Spr 2024

Louisiana Tech University (Senior Capstone)

Can Hong: <i>The theory of cryptography in Bitcoin</i>	Spr 2020
Bryan McCormick: <i>The axiom of choice and related topics</i>	Spr 2020
Luke Seaton: <i>Periodic points and Sharkovsky's theorem</i>	Spr 2020
Katherine Willrich: <i>Pisano periods: a comparison study</i>	Spr 2019

Courses Taught

Oklahoma State University

Fall 2020–present

Calculus I (MATH 2144)	Fall 2021, 2022 ($\times 2$)
Calculus II (MATH 2153)	Fall 2023–2025; Spr 2024
Calculus III (MATH 2163)	Fall 2020
Introduction to Abstract Algebra (MATH 3613)	Fall 2020, 2025; Spr 2026
Abstract Algebra I (MATH 4613/5003)	Fall 2023, 2024
Abstract Algebra II (MATH 4623/5013)	Spr 2024, 2025
Number Theory (MATH 4713/5713)	Fall 2021
Arithmetic Dynamics (MATH 5010)	Spr 2023
Algebra I (MATH 5613)	Spr 2021, 2022
Algebraic Curves (MATH 6490)	Spr 2025

Louisiana Tech University**Fall 2017–Spring 2020**

Discrete Mathematics (MATH 311)	Win 2019
Introduction to Abstract Algebra (MATH 408)	Fall 2017–2019
Theory of Functions of Complex Variables (MATH 455)	Spr 2019
Number Theory (MATH 460)	Spr 2018, 2020
Introduction to Real Analysis (MATH 482)	Win 2020
Abstract Algebra II (MATH 490/584)	Win 2018

University of Rochester**Fall 2014–Spring 2017**

Calculus II (MTH 142)	Fall 2014, Spr 2016
Calculus IA (MTH 161)	Spr 2015; Fall 2015 [†] , 2016 (×2) [†]
Linear Algebra with Differential Equations (MTH 165)	Fall 2014
Transition to Advanced Mathematics (MTH 200W)	Spr 2016, 2017
Number Theory with Applications (MTH 230)	Fall 2015
Introduction to Cryptography (MTH 233)	Spr 2017
Introduction to Algebra I (MTH 236)	Spr 2015
Independent Study in Arithmetic Dynamics (MTH 391)	Fall 2016

[†] I was responsible for coordinating all sections of MTH 161 and was co-instructor of CAS 352–355, where we met weekly with workshop leaders to discuss both pedagogy and specific content to be covered in the workshops.

University of Georgia**Fall 2008–Spring 2014**

Precalculus (MATH1113)	Fall 2009, 2011
Analytic Geometry and Calculus (MATH2200)	Spr 2010
Calculus I for Science and Engineering (MATH2250)	Fall 2013; Spr 2012, 2014; Sum 2012
Calculus II for Science and Engineering (MATH2260)	Sum 2013

Service (at Oklahoma State; outside of department)**College (Arts and Sciences)**

Recruitment Committee	Fall 2024–present
Reviewer for Wentz Research Scholars Program	Spr 2023–present

University

Academic Integrity Facilitator	Fall 2023–present
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Awards and Grants

NSF DMS-2302394	June 2023–May 2026
<i>Moduli spaces and Galois theory in arithmetic dynamics</i> (\$136,482)	
NSF DMS-2001486/DMS-2112697	May 2020–Apr 2023
<i>Moduli spaces and Galois theory in arithmetic dynamics</i> (\$116,762)	
AMS-Simons Travel Grant	July 2016–June 2018
University Outstanding Teaching Assistant Award (UGA)	2013
B. J. Ball Scholarship (UGA)	2012
VIGRE Fellowship (UGA)	2008, 2010, 2012