

<http://maths.dk>
david.krumm@gmail.com
ORCID: 0000-0001-9999-2166

Citizenship

Costa Rica, Chile, United States

Appointments

Acting Assistant Professor, University of Costa Rica, 2024
Visiting Assistant Professor, Reed College, 2018 - 2022
Visiting Assistant Professor, Colby College, 2015 - 2018
Visiting Assistant Professor, Claremont McKenna College, 2013 - 2015

Professional Preparation

Ph.D. Mathematics, University of Georgia, 2013. Advisor: Dino Lorenzini
M.S. Mathematics, Georgia Institute of Technology, 2008. Advisor: Matt Baker
B.S. Mathematics, University of Costa Rica, 2005

Research areas

Arithmetic geometry, algebraic number theory, arithmetic dynamics

Publications

14. *Portraits of quadratic rational maps with a small critical cycle*, with Tyler Dunaisky. *Journal of Number Theory* 275 (2025), 135-159.
13. *Algebraic periodic points of transcendental entire functions*, with Diego Marques, Carlos Gustavo Moreira, and Pavel Trojovský. *International Journal of Number Theory*. Accepted for publication.
12. *Dynatomic Galois groups for a family of quadratic rational maps*, with Allan Lacy. *International Journal of Number Theory* 20 (2024), no. 7, 1701-1724.
11. *Quadratic points on dynamical modular curves*, with John Doyle. *Research in Number Theory* 10, 59 (2024).
10. *Morikawa's unsolved problem*, with Jan Holly. *The American Mathematical Monthly* 128 (2021), no. 3, 214-237.
9. *Twists of hyperelliptic curves by integers in progressions modulo p* , with Paul Pollack. *Acta Arithmetica* 192 (2020), no. 1, 63-71.

8. *A finiteness theorem for specializations of dynatomic polynomials*
Algebra & Number Theory 13 (2019), no. 4, 963-993.
7. *Galois groups over rational function fields and explicit Hilbert irreducibility*, with Nicole Sutherland.
Journal of Symbolic Computation 103 (2021), 108-126.
6. *Galois groups in a family of dynatomic polynomials*
Journal of Number Theory 187 (2018), 469-511.
5. *A local-global principle in the dynamics of quadratic polynomials*
International Journal of Number Theory 12 (2016), no. 8, 2265-2297.
4. *Squarefree parts of polynomial values*
Journal de Théorie des Nombres de Bordeaux 28 (2016), 699-724.
3. *Computing points of bounded height in projective space over a number field*
Mathematics of Computation 85 (2016), 423-447.
2. *Computing algebraic numbers of bounded height*, with John Doyle.
Mathematics of Computation 84 (2015), 2867-2891.
1. *Preperiodic points for quadratic polynomials over quadratic fields*, with John Doyle and Xander Faber.
New York Journal of Mathematics 20 (2014), 507-605.

Teaching Experience

University of Costa Rica, 2024 - 2024

Linear algebra II: Spring 2024

Intro to algebraic curves: Fall 2024

Reed College, 2018-2022

Galois theory: Fall 2021

Topology: Spring 2022

Complex analysis: Spring 2022

Abstract algebra: Spring 2020

Real analysis: Fall 2020

Number theory: Spring 2021

Vector calculus: Spring 2020

Discrete structures: Fall 2021

Introduction to Analysis: Spring 2019, Fall 2019, Spring 2021

Linear Algebra: Fall 2018

Calculus I: Fall 2018, Fall 2020

Colby College, 2015-2018

Complex Analysis: Fall 2017

Cryptography: Spring 2017

Number Theory: Spring 2016

Calculus II: Fall 2016, Spring 2017, Fall 2017

Calculus I: Fall 2015, Spring 2016, Fall 2016, Spring 2018

Claremont McKenna College, 2013-2015

Abstract Algebra: Spring 2015

Number Theory: Spring 2014
Linear Algebra: Fall 2014
Calculus II: Spring 2014, Fall 2014, Spring 2015
Calculus I: Fall 2013

University of Georgia, 2008-2012

Calculus for Science & Engineering: Fall 2011, Spring 2012
Calculus I: Spring 2010
Precalculus: Fall 2009

Georgia Institute of Technology, 2008

Calculus III: Spring 2008
Calculus II: Summer 2008

Undergraduate research supervision

Advisor for senior thesis student Tyler Dunaisky (Reed College, B.A. May 2022)

Thesis title: *Dynamics of quadratic rational maps with maximal automorphism group*
Available through Reed Digital Collections at <https://rdc.reed.edu/>

Advisor for senior thesis student Liz Prestegaard (Reed College, B.A. May 2022)

Thesis title: *The lattice of Alexandrov topologies*
Available through Reed Digital Collections at <https://rdc.reed.edu/>

Advisor for senior thesis student Peter Marcus (Reed College, B.A. May 2021)

Thesis title: *Computing the henselization of a valued field*
Available through Reed Digital Collections at <https://rdc.reed.edu/>

Advisor for senior thesis student Pallavi Prakash (Reed College, B.A. May 2019)

Thesis title: *Rational periodic points of quadratic maps*
Available through Reed Digital Collections at <https://rdc.reed.edu/>

Advisor for senior thesis student Jonathan Star (Claremont McKenna College, B.A. May 2015)

Thesis title: *Elliptic curves and the congruent number problem*
Available at http://scholarship.claremont.edu/cmc_theses/1120/

Advisor for senior thesis student Arvind Suresh (Claremont McKenna College, B.A. May 2015)

Thesis title: *On the characterization of prime sets of polynomials by congruence conditions*
Available at http://scholarship.claremont.edu/cmc_theses/993/

Reader for senior thesis student John Shaughnessy (Claremont McKenna College, B.A. May 2014)

Thesis title: *Finding zeros of rational quadratic forms*
Available at http://scholarship.claremont.edu/cmc_theses/849/

Awards, Fellowships, Grants

AMS grant for travel to the ICM, 2014
 AMS-Simons Travel Grant, 2013-2015
 University of Georgia Outstanding Teaching Assistant Award, 2013
 William Armor Wills Memorial Scholarship Award, 2013
 AMS Graduate Student Travel Grant, 2012
 University of Georgia Dissertation Completion Award, 2012
 National Science Foundation VIGRE Fellowship, 2008 and 2010
 Goizueta Foundation Fellowship, 2007

Research Talks

Dynamical Galois groups and rational portraits in one-parameter families of arithmetic dynamical systems. Oregon State University number theory seminar, February 2024.

Algorithmic specialization of Galois groups over function fields. Jornada de Álgebra y Aplicaciones, San José, Costa Rica, December 2023.

Arithmetic dynamics in families of quadratic rational maps. University of Costa Rica mathematics colloquium, October 2023.

Classification of pre-periodic portraits for quadratic polynomials over quadratic number fields. Oregon State University number theory seminar, April 2022.

Classification of pre-periodic portraits for quadratic polynomials over quadratic number fields. SIMMAC XXIII, February 2022.

Twists of hyperelliptic curves by integers in progressions modulo p . University of Costa Rica mathematics colloquium, May 2021.

Twists of hyperelliptic curves by integers in progressions modulo p . Oklahoma State University number theory seminar, April 2021.

Classification of preperiodic portraits for quadratic polynomials over quadratic fields. AMS Special Session on Current Trends in Arithmetic Dynamics, Joint Mathematics Meetings, January 2021.

Algebraic preperiodic points of entire transcendental functions. AMS Special Session on Arithmetic Dynamics, Joint Mathematics Meetings, Denver, Colorado, January 2020.

Algebraic preperiodic points of entire transcendental functions. Oregon Number Theory Days, November 2019.

Algebraic preperiodic points of entire transcendental functions. Maine-Québec Number Theory Conference. University of Maine, Orono, October 2019.

A family of Galois groups in arithmetic dynamics. Portland State University mathematics colloquium, April 2019.

A family of Galois groups in arithmetic dynamics. Oregon State University number theory seminar, April 2019.

Finiteness criteria related to Hilbert's irreducibility theorem. Integers Conference, October 2018.

Finiteness questions related to Hilbert's irreducibility theorem. University of Costa Rica mathematics colloquium, July 2018.

A finiteness theorem for specializations of dynatomic polynomials. AMS Special Session on Arithmetic Dynamics, Joint Mathematics Meetings, San Diego, California, January 2018.

Galois groups in a family of dynatomic polynomials. Mathematical Congress of the Americas, special session on arithmetic dynamics. Montréal, Canada, July 2017.

Galois groups in a family of dynatomic polynomials. University of Georgia, March 2017.

The global dynamics of quadratic maps on the projective line. University of Maine mathematics colloquium, December 2016.

Explicit Hilbert Irreducibility. University of Georgia number theory seminar, November 2016.

Explicit Hilbert Irreducibility. Maine-Québec Number Theory Conference. Laval University, October 2016.

Explicit Hilbert Irreducibility. University of Costa Rica mathematics colloquium, August 2016.

A local obstruction for periodic points under iteration of quadratic polynomials. RTG Workshop on Arithmetic Dynamics. University of Michigan, December 2015.

The global dynamics of quadratic maps on the projective line. Colby-Bates-Bowdoin Mathematics Seminar. Bates College, October 2015.

A local-global principle in the dynamics of quadratic polynomials. Maine-Québec Number Theory Conference. University of Maine, Orono, October 2015.

A local-global principle in the dynamics of polynomial maps. AMS Western Sectional Meeting, special session on Arithmetic Geometry. University of Nevada, Las Vegas, April 2015.

Squarefree parts of polynomial values. MAA MathFest, General contributed paper session on number theory. Portland, Oregon, August 2014.

Squarefree parts of polynomial values. Michigan State University algebra seminar, April 2014.

Squarefree parts of polynomial values. UC San Diego number theory seminar, March 2014.

Computing points of bounded height in $\mathbb{P}^N$ over a number field. Sage Days 55: Arithmetic and Complex Dynamics. Florida Institute of Technology, November 2013.

Preperiodic points for quadratic polynomials, I. AMS Western Sectional Meeting, special session on heights, Diophantine problems, and lattices. University of California, Riverside, November 2013.

Quadratic points on dynamical modular curves. Canadian Mathematical Society Summer Meeting, special session on experimental methods in number theory. Dalhousie University, June 2013.

Quadratic points on dynamical modular curves. Center for Communications Research, San Diego, California, April 2013.

Preperiodic points for quadratic polynomials. Advances in number theory and dynamical systems. University of Bristol, April 2013.

Preperiodic points for quadratic polynomials. Johns Hopkins University algebraic geometry & number theory seminar, February 2013.

Computing algebraic numbers of bounded height. AMS Special Session on Mathematics of Computation, Joint Mathematics Meetings, San Diego, California, January 2013.

Preperiodic points for quadratic polynomials. Clemson University number theory seminar, December 2012.

Preperiodic points for quadratic polynomials. Duke University algebraic geometry seminar, November 2012.

Preperiodic points for quadratic polynomials. Georgia Institute of Technology algebra seminar, November 2012.

Computation of preperiodic structures of quadratic polynomials over number fields. Canadian Number Theory Association XII Meeting. University of Lethbridge, June 2012.

Computing numbers of bounded height. Palmetto Number Theory Series XVI. Emory University, September 2011.

The BSD conjecture and related questions. University of Costa Rica, May 2011.

Stable reduction of curves of genus 2. University of Georgia number theory seminar, November 2010.

Conferences Attended

Jornada de Álgebra y Aplicaciones (San José, Costa Rica 2023)

SIMMAC XXIII (San José, Costa Rica 2022)

Oregon Number Theory Days (Portland, Oregon 2021)

Joint Mathematics Meetings 2021

Joint Mathematics Meetings (Denver, Colorado 2020)

Oregon Number Theory Days (Eugene, Oregon 2019)

Maine-Québec Number Theory Conference (Orono, Maine 2019)

Number Theory in the Americas (Oaxaca, Mexico 2019)

HINT 2019 (Honolulu, Hawaii)

Integers Conference (Augusta, Georgia 2018)

Joint Mathematics Meetings (San Diego, California 2018)

Mathematical Congress of the Americas (Montréal, Canada 2017)

Inquiry Based Learning Workshop (San Luis Obispo, California 2017)

Potential Theory and Arithmetic Dynamics (Athens, Georgia 2017)

Maine-Québec Number Theory Conference (Québec City, Canada 2016)

RTG Workshop on Arithmetic Dynamics (Ann Arbor, Michigan 2015)

Maine-Québec Number Theory Conference (Orono, Maine 2015)

AMS Western Sectional Meeting (Las Vegas, Nevada 2015)

International Congress of Mathematicians (Seoul, Korea 2014)

MAA MathFest (Portland, Oregon 2014)

Southern California Number Theory Day (Pasadena, California 2014)

Sage Days 55: Arithmetic and Complex Dynamics (Melbourne, Florida 2013)

AMS Western Sectional Meeting (Riverside, California 2013)

Canadian Mathematical Society Summer Meeting (Halifax, Nova Scotia 2013)

Advances in number theory and dynamical systems (Bristol, UK 2013)

Joint Mathematics Meetings (San Diego, California 2013)

Canadian Number Theory Association XII Meeting (Lethbridge, Alberta 2012)

Summer School on Contemporary Methods for Solving Diophantine Equations (Banff, Alberta 2012)

Palmetto Number Theory Series XVI (Atlanta, Georgia 2011)

Summer School Program in Arithmetic Dynamics (Athens, Georgia 2011)

Second Summer School UCR & CSU (San José, Costa Rica 2011)

Canadian Number Theory Association XI Meeting (Wolfville, Nova Scotia 2010)

AMS Southeastern Section Meeting (Boca Raton, Florida 2009)

Palmetto Number Theory Series X (Savannah, Georgia 2009)

Doctoral Program on Diophantine Geometry (Rennes, France 2009)

Arizona Winter School in Mathematics (Tucson, Arizona 2007)

Last updated: March 6, 2025