

Brian Simanek

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Employment

- Baylor University*: Associate Professor August 2021 - Present
- Baylor University*: Assistant Professor August 2015 - July 2021
- Vanderbilt University*: Non Tenure-Track Assistant Professor August 2012 - July 2015

Education

-California Institute of Technology

- Ph.D. in Mathematics, June 2012
 - Advisor: Barry Simon
 - Thesis Title: Asymptotic Properties of Orthogonal and Extremal Polynomials

-Williams College

- Bachelor of Arts 2007, *Summa Cum Laude*, Highest Honors in Mathematics
- Double Major: Mathematics and Physics

Awards and Honors

- Simons Collaboration Grant: 2020 – Present
- NSF Conference Grant (co-PI): *Texas Analysis and Math Physics Symposium*, 2018
- NSF Conference Grant (co-PI): *Constructive Functions 2014 Conference and School*, 2014
- AMS-Simons Travel Grant, July 2013 – June 2015
- National Science Foundation (NSF) Graduate Research Fellow, 2009–2012
- Barry Goldwater Scholar, 2006
- Williams College Rosenberg Prize in Mathematics, 2007
- Williams College Phi Beta Kappa, 2006
- National Merit Scholar, 2003

Publications

- (37) (with A. Kraus) *Bounded Connected Components of Polynomial Lemniscates*, submitted for publication.
- (36) (with A. Kraus) *New Perspectives on Torsional Rigidity and Polynomial Approximations of z -bar*, submitted for publication.
- (35) (with N. Revilla) *Hyponormal Toeplitz Operators on the Bergman Space of the Disk*, accepted for publication in *Pure and Applied Functional Analysis* (volume in honor of Fritz Gesztesy's 70th birthday).
- (34) (with H. Handley) *Discrete m -functions with doubly palindromic continued fraction coefficients*, submitted for publication.

- (33) *Determinantal formulas for exceptional orthogonal polynomials*, SIGMA 18 (2022), paper no. 047, 16pp.
- (32) (with B. Eichinger and M. Lukic) *An approach to universality using Weyl m -functions*, submitted for publication.
- (31) (with M. Hunziker, A. Martinez-Finkelshtein, and T. Poe) *On foci of ellipses inscribed in cyclic polygons*, In: Gesztesy F., Martinez-Finkelshtein A. (eds) *From Operator Theory to Orthogonal Polynomials, Combinatorics, and Number Theory. Operator Theory: Advances and Applications* 285 (2021), 213–238.
- (30) (with M. Hunziker, A. Martinez-Finkelshtein, and T. Poe) *Poncelet-Darboux, Kippenhahn, and Szegő: interactions between projective geometry, matrices, and orthogonal polynomials*, *Journal of Mathematical Analysis and Applications* 511 (2022), no. 1, 126049.
- (29) *Convergence rates of exceptional zeros of exceptional orthogonal polynomials*, *Computational Methods and Function Theory* 23 (2023), no. 4, 629–649.
- (28) (with K. Johnson) *Electrostatic equilibria on the unit circle via Jacobi polynomials*, *Journal of Mathematical Physics* 61 (2020), no. 12, 122901.
- (27) (with L. Harris) *Interpolation and cubature for rectangular sets of nodes*, *Proceedings of the American Mathematical Society* 149 (2021), no. 8, 3485–3497.
- (26) (with T. Le) *Hyponormal Toeplitz operators on weighted Bergman space*, *Integral Transforms and Special Functions* 32 (2021), no. 5-8, 560–567.
- (25) *Zero spacings of paraorthogonal polynomials on the unit circle*, *Journal of Approximation Theory* 256 (2020), 105437.
- (24) (with R. Grigorchuk) *Spectra of Cayley graphs of the lamplighter group and random Schrödinger operators*, *Transactions of the American Mathematical Society* 374 (2021), no. 4, 2421–2445.
- (23) (with A. Martinez-Finkelshtein and B. Simon) *Poncelet’s Theorem, paraorthogonal polynomials and the numerical range of compressed multiplication operators*, *Advances in Mathematics* 49 (2019), 992–1035.
- (22) *Hyponormal Toeplitz operators with non-harmonic algebraic symbol*, *Analysis and Mathematical Physics* 9 (2019), no. 4, 1613–1626.
- (21) (with B. Osting) *A maximal energy pointset configuration problem*, *Journal of Math Analysis and Applications* 85 (2020), no. 2, 123830.
- (20) *Applications of a new formula for OPUC with periodic Verblunsky coefficients*, *Research in the Mathematical Sciences* 5 (2018), no. 4, 5–42.
- (19) *Universality at an endpoint for orthogonal polynomials with Geronimus-type weights*, *Proceedings of the American Mathematical Society* 146 (2018), no. 9, 3995–4007.
- (18) (with M. Derevyagin) *Asymptotics for polynomials orthogonal in an indefinite metric*, *Journal of Math Analysis and Applications* 460 (2018), no. 2, 777–793.
- (17) (with M. Fleeman) *Torsional rigidity and Bergman analytic content of simply connected regions*, *Computational Methods and Function Theory* 19 (2019), no. 1, 37–63.
- (16) (with T. Ferguson and T. Mei) *H^∞ -calculus for semigroup generators on BMO*, *Advances in Mathematics* 347 (2019), 408–441.

- (15) (with M. Derevyagin) *On Szegő's Theorem for a non-classical case*, Journal of Functional Analysis 272 (2017), no. 6, 2487–2503.
- (14) (with C. Beneteau, D. Khavinson, C. Liaw, and D. Seco) *Zeros of optimal polynomial approximants, Jacobi matrices, and Jentzsch-type theorems*, Revista Matemática Iberoamericana 35 (2019), no. 2, 607–642.
- (13) *Two universality results for polynomial reproducing kernels*, Journal of Approximation Theory 216 (2017), 16–37.
- (12) *Relative asymptotics for general orthogonal polynomials*, Michigan Mathematical Journal 66 (2017), no. 1, 175–193.
- (11) *Asymptotically optimal configurations for Chebyshev constants with an integrable kernel*, New York Journal of Mathematics 22 (2016), 667–675.
- (10) *An electrostatic interpretation of the zeros of paraorthogonal polynomials on the unit circle*, SIAM Journal on Mathematical Analysis 48 (2016), no. 3, 2250–2268.
- (9) (with D. Hardin and E. Saff) *Periodic discrete energy for long-range potentials*, Journal of Mathematical Physics 55 (2014), no. 12, 123509.
- (8) *The Bergman shift operator on polynomial lemniscates*, Constructive Approximation 41 (2015), no. 1, 113–131.
- (7) *Ratio asymptotics, Hessenberg matrices, and weak asymptotic measures*, International Math Research Notices (2014), no. 24, 6798–6825.
- (6) (with Erwin Miña-Díaz) *Spectral transforms of measures and orthogonal polynomials on regions*, Journal of Mathematical Analysis and Applications, 407 (2013), no. 2, 290–304.
- (5) *A new approach to ratio asymptotics for orthogonal polynomials*, Journal of Spectral Theory 2 (2012), no. 4, 373–395.
- (4) *Asymptotic properties of extremal polynomials corresponding to measures supported on analytic regions*, Journal of Approximation Theory, 170 (2013), 172–197.
- (3) *Weak convergence of CD kernels: A new approach on the circle and real line*, Journal of Approximation Theory 164 (2012), no. 1, 204–209.
- (2) *Zeros of non-Baxter paraorthogonal polynomials on the unit circle*, Constructive Approximation, 35 (2012), no. 1, 107–121.
- (1) (with J. Chatlos, N. Watson, and S. Wu) *Semi-latical formal fibers of principal prime ideals*, Journal of Commutative Algebra 4 (2012), no. 3, 369–385.
- (0) (with G. Hatfull, M. Pedulla, D. Jacobs-Sera, et al.) *Exploring the mycobacteriophage metaproteome: phage genomics as an educational platform*, PLoS Genetics 2:e92 (2006).

Volumes Edited

- (with Doug Hardin and Doron Lubinsky) *Modern trends in constructive function theory*, Contemporary Mathematics, 661, American Mathematical Society, Providence, RI, 2016.

Invited Talks

- International Conference on Approximation and Potential Theory, Savannah, GA, September, 2023
 - *Paraorthogonal Polynomials on the Unit Circle*
- Foundations of Computational Math (workshop talk), Paris, France, June, 2023
 - *An Approach to Universality Using Weyl m -functions*
- Joint Mathematics Meetings Special Session, Boston, January, 2023
 - *Universality Limits for Orthogonal Polynomials*
- SIAM Texas-Louisiana Section Meeting, Houston, TX, November, 2022
 - *Hyponormal Toeplitz Operators Acting on the Bergman Space*
- AMS Section Meeting: Special Session, Virtual, October, 2020
 - *Orthogonal Polynomials and Poncelet Ellipses*
- OPSFA: Special Session, Hagenberg, Austria, July, 2019
 - *Blaschke Products, Numerical Ranges, and Zeros of Orthogonal Polynomials*
- Southeastern Analysis Meeting, Tuscaloosa, AL, March, 2019
 - *Blaschke Products, Numerical Ranges, and Zeros of Orthogonal Polynomials*
- Workshop on Groups, Dynamics, and Operator Algebras, Texas A&M, November, 2018
 - *Blaschke Products, Numerical Ranges, and Zeros of Orthogonal Polynomials*
- AMS Section Meeting: Special Session, Portland State, April, 2018
 - *Hyponormal Toeplitz Operators Acting on the Bergman Space*
- Analysis, Approximation Theory, Operator Theory and their Interconnections; Columbus, OH, March, 2018
 - *Geronimus Polynomials and Chebyshev Polynomials*
- Joint Mathematics Meetings Special Session, San Diego, January, 2018
 - *Geronimus Polynomials and Chebyshev Polynomials*
- AMS Section Meeting: Special Session, UCF, September, 2017
 - *Torsional Rigidity and Bergman Polynomials*
- Foundations of Computational Math (workshop talk), Barcelona, Spain, July, 2017
 - *Bergman Polynomials and Torsional Rigidity*
- Joint Mathematics Meetings Special Session, Atlanta, GA, January, 2017
 - *New Universality Results for Polynomial Reproducing Kernels*
- Methods of Modern Mathematical Physics, Fields Institute, Toronto, August, 2016
 - *Zeros of Optimal Polynomial Approximants*
- Orthogonal and Multiple Orthogonal Polynomials, BIRS-CMO, Mexico, August, 2015
 - *Orthogonal Polynomials and the Bergman Shift Matrix*
- OPSFA: Special Session, NIST, Gaithersburg, MD, USA, June, 2015
 - *Ratio Asymptotics and Weak Asymptotic Measures*

- Complex Analysis & Dynamical Systems VII, Nahariya, Israel, May, 2015
 - *Paraorthogonal Polynomials and Electrostatics on the Unit Circle*
- AMS Section Meeting: Special Session on Spectral Theory, U. of New Mexico, April, 2014
 - *Orthogonal Polynomials and the Bergman Shift Operator*
- SIAM Annual Meeting, July, 2013
 - *Spectral Transforms and Orthogonal Polynomials on Regions*
- AMS Section Meeting: Special Session on Approximation Theory, Ole Miss, March, 2013
 - *The Bergman Shift Operator on Weighted Spaces*
- AMS Section Meeting: Special Session on Spectral Theory, USF, March, 2012
 - *Ratio Asymptotics for General Orthogonal Polynomials*

Seminar Talks

- Williams College Faculty Seminar, Williamstown, MA, November, 2023
 - *Blaschke Products, Numerical Ranges, and Zeros of Orthogonal Polynomials*
- Texas State Differential Eq. and Applied Math Seminar, San Marcos, TX, February, 2022
 - *Blaschke Products, Numerical Ranges, and Zeros of Orthogonal Polynomials*
- Michigan Integrable Systems and Random Matrices Seminar, Virtual, October, 2021
 - *Universality Limits for Orthogonal Polynomials*
- St. Petersburg State Spectral Theory Seminar, Virtual, September, 2021
 - *Universality Limits for Orthogonal Polynomials*
- Rice Spectral Theory Seminar, Houston, TX, March, 2020
 - *Torsional Rigidity of Planar Domains*
- Joint KTH/Stockholm University Analysis Seminar, Stockholm, Sweden, April, 2019
 - *Blaschke Products, Numerical Ranges, and Zeros of Orthogonal Polynomials*
- Lund University Analysis Seminar, Lund, Sweden, April, 2019
 - *Blaschke Products, Numerical Ranges, and Zeros of Orthogonal Polynomials*
- Texas A&M Groups and Dynamics Seminar, College Station, TX, March, 2019
 - *Spectral Theory of Graph Laplacians and Orthogonal Polynomials*
- Houston Analysis Seminar, Houston, TX, March, 2019
 - *Blaschke Products, Numerical Ranges, and Zeros of Orthogonal Polynomials*
- Kentucky Analysis & PDE Seminar, Lexington, KY, December, 2018
 - *Blaschke Products, Numerical Ranges, and Zeros of Orthogonal Polynomials*
- Baylor Analysis Seminar, Waco, TX, November, 2018
 - *Blaschke Products, Numerical Ranges, and Zeros of Orthogonal Polynomials*
- The Ohio State Analysis and Operator Theory Seminar, Columbus, OH, January, 2017
 - *Relative Asymptotics of Orthogonal Polynomials*

- University of Mississippi Analysis Seminar, Oxford, MS, March, 2016
 - *Paraorthogonal Polynomials on the Unit Circle and Their Zeros*
- Baylor Analysis Seminar, Waco, TX, September, 2015
 - *An Introduction to Minimum Energy Problems and Extremal Polarization Configurations for Integrable Kernels*
- Hebrew University of Jerusalem PDE Seminar, Jerusalem, Israel, May, 2015
 - *Paraorthogonal Polynomials and Electrostatics on the Unit Circle*
- University of Cyprus Math Seminar, Nicosia, Cyprus, May, 2015
 - *Ratio Asymptotics & Weak Asymptotic Measures for General Orthogonal Polynomials*
- University of Utah Applied Math Seminar, Salt Lake City, UT, April, 2015
 - *Paraorthogonal Polynomials and Electrostatics on the Unit Circle*
- University of Copenhagen Analysis Seminar, March, 2012
 - *Asymptotics of General Orthogonal Polynomials*
- University of Mississippi Analysis Seminar, March, 2012
 - *Asymptotic Properties of Extremal Polynomials*
- UC Irvine Mathematical Physics Seminar, March, 2012
 - *Asymptotic Properties of Extremal Polynomials*

Selected Contributed Talks

- Baylor Analysis Fest, Baylor University, May, 2022
 - *Determinantal Formulas for Exceptional Orthogonal Polynomials*
- TexAMP, Virtual, April, 2021
 - *Electrostatics and Zeros of Orthogonal Polynomials*
- TexAMP, Rice University, January, 2020
 - *Zeros of Paraorthogonal Polynomials*
- TexAMP, University of Texas, November, 2017
 - *Geronimus Polynomials and Chebyshev Polynomials*
- OPSFA, Kent University, UK, July, 2017
 - *Non-classical Orthogonal Polynomials on the Unit Circle*
- Computational Methods and Function Theory,, Lublin, Poland, July, 2017
 - *Asymptotically optimal point configurations for Chebyshev constants*
- TexAMP, Rice University, October, 2016
 - *Universality Results for Polynomial Reproducing Kernels*
- Southeastern Analysis Meeting, South Florida, March, 2016
 - *Relative Ratio Asymptotics for General Orthogonal Polynomials*
- TexAMP, UT-Dallas, November 2015

- *Right Limits of the Bergman Shift Matrix*
- Joint Mathematics Meetings Contributed Session, San Antonio, TX, January, 2015
 - *Optimal Polarization for Integrable Kernels*
- ESI Workshop on Optimal Point Configurations, Vienna Austria, October, 2014
 - *Periodic Discrete Energy*
- Midwestern Workshop on Asymptotic Analysis, Fort Wayne, IN September, 2014
 - *Orthogonal Polynomials on Polynomial Lemniscates*
- Constructive Functions, Vanderbilt, May, 2014
 - *Periodic Discrete Energy in Euclidean Space*
- Computational Methods and Function Theory, Shantou China, June, 2013
 - *Asymptotics of Orthogonal and Extremal Polynomials*
- Western States Mathematical Physics Meeting, Caltech, February, 2012
 - *Ratio Asymptotics for Extremal Polynomials*
- OPSFA, Madrid Spain, August, 2011
 - *Asymptotic Properties of Polynomials Orthogonal over Analytic Regions*
- International Symposium in Approximation Theory, Vanderbilt, May, 2011
 - *Weak Convergence of CD Kernels: A New Approach*

Teaching Experience

- Baylor University
 - Instructor for: Calculus I (Fall 2015 & Fall 2021), Calculus II (Fall 2016 & Fall 2020), Calculus III (Fall 2017, Fall 2018, & Fall 2019), Complex Variables (Spring & Fall 2016), Cryptology (Spring 2021 & Spring 2023), Linear Algebra (Fall 2023), Matrix Theory (Fall 2019, Fall 2020, Fall 2022, & Fall 2023), Graduate Complex Analysis (Spring 2018, Spring 2020, & Spring 2022), Potential Theory (Spring 2017), Functional Analysis (Fall 2022).
 - Honors Colloquium (Spring & Fall 2023)
- Vanderbilt University
 - Instructor for: Accelerated Calculus II (Fall 2014), Graduate Complex Analysis (Fall 2014), Ordinary Differential Equations (Spring 2014), Accelerated Calculus I (Fall 2013), Differential Equations with Linear Algebra (Spring 2013).

Student Research Supervised

- Kev Johnson (Ph.D. student, 2018–2020)
- Taylor Poe (Ph.D. student, 2019–2021; joint with A. Martinez-Finkelshtein)
- Adam Kraus (Ph.D. student 2022–present)
- Hunter Handley (undergraduate thesis, 2021–2022)
- Harrison Jansma (undergraduate thesis, 2016–2017)
- Dohyun Kim (undergraduate independent study, 2017–2018)

- Nicole Revilla (undergraduate independent study, 2021–2022)
- Izzy Estrada (undergraduate independent study, 2022–2023)

Conferences and Workshops Attended

- International Conference on Approximation and Potential Theory, Savannah, GA, 2023
- SIAM Texas-Louisiana Section Meeting, Houston, TX, November, 2022
- Baylor Analysis Fest, Baylor University, May, 2022
- Barry Simon 75th Birthday Conference, Virtual, April, 2021
- Many-Body Theory, Random Operators, & Matrices, Institut Mittag-Leffler, April, 2019
- Groups, Dynamics, and Operator Algebras, Texas A&M, November, 2018
- Analysis, Approximation Theory, Operator Theory and their Interconnections, 2018
- Foundations of Computational Math, Barcelona (2017), & Paris (2023)
- Conference on Methods of Modern Mathematical Physics, Toronto, August, 2016
- Southeastern Analysis Meeting, South Florida, March, 2016 & Alabama, March, 2019
- TexAMP
 - UT-Dallas ('15), Rice ('16 & '20), UT-Austin ('17), Baylor ('18), Virtual ('21)
- Orthogonal and Multiple Orthogonal Polynomials, Oaxaca Mexico, August, 2015
- Complex Analysis & Dynamical Systems VII, Nahariya Israel, May, 2015
- ESI Workshop on Optimal Point Configurations, Vienna Austria, October, 2014
- Midwestern Workshop on Asymptotic Analysis, Fort Wayne, IN, September, 2014
- Recent Methods in Sphere Packing and Optimization, Oberwolfach, Germany, June, 2014
- Constructive Functions 2014, Nashville, TN, May, 2014
- SIAM Annual Meeting, San Diego, CA, July, 2013
- CMFT: Shantou, China (2013) & Lublin, Poland (2017)
- Arizona School of Analysis and Mathematical Physics, Tucson, AZ March, 2012
- AMS Section Meeting
 - Tampa ('12), Oxford, MS ('13), Albuquerque ('14), Orlando ('17), Portland ('18), Virtual ('20)
- Partial Differential Equations and Spectral Theory, London, UK September, 2011
- OPSFA:
 - Madrid ('11), NIST ('15), Canterbury ('17), Hagenberg ('19), Virtual ('22)
- NSF-CBMS Conference on Global Harmonic Analysis, Lexington, KY June, 2011
- International Symposium in Approximation Theory, Nashville, TN May, 2011
- PIMS Summer School in Probability, Seattle, WA, June, 2010
- AMS-MAA Joint Meetings
 - San Francisco ('10), San Antonio ('15), Atlanta ('17), San Diego ('18), Boston ('23)
- Southern California Analysis and PDE, Fall, 2009 & 2011 (Irvine) & 2010 (UCLA)
- Western States Mathematical Physics Meeting, Caltech, February, 2009 – 2012

Service

- Associate Editor for Journal of Approximation Theory, (2023 – present)

- Co-organizer of Baylor Analysis Seminar (2015 – present)
- Baylor Math Colloquium Chair (2017 – present)
- Reviewer for Math Reviews
- Review Editor for Mathematics of Computation and Data Science, 2016–2019
- Organizing Committee for 2018 Texas Analysis and Mathematical Physics Symposium
- Baylor chapter of Phi Beta Kappa (member: 2015–present; treasurer: 2018 – present)
- Baylor Calendar Committee (2019 – present)
- Baylor Public Exercises Committee/Commencement Committee (2019–2022)
- Baylor Math Club advisor (2020–present)
- Referee for
 - *Advances in Mathematics, Analysis and Mathematical Physics, Annals of Functional Analysis, Bulletin of the London Mathematical Society, Complex Analysis and Operator Theory, Computational Methods and Function Theory, Constructive Approximation, Discrete & Computational Geometry, Electronic Transactions in Numerical Analysis, Experimental Mathematics, Forum Mathematicum, Journal d'Analyse Mathématique, Journal of Approximation Theory, Journal of Inequalities and Applications, Journal of Math Analysis and Applications, Journal of Spectral Theory, Journal of Statistical Physics, Matematicheskii Sbornik, Mathematical Models & Methods in Applied Sciences, Minnesota Journal of Undergraduate Mathematics, Operators and Matrices, Proceedings of the AMS, The Ramanujan Journal, Random Matrices: Theory and Applications, Reports on Mathematical Physics, Rocky Mountain Journal of Mathematics, SIGMA, Special Matrices, and Transactions of the AMS*
- Organizing Committee for Constructive Functions 2014 Conference & School

Research and Work Experience

- Researcher in SMALL REU at Williams College, June–August, 2005
- Microbiology Laboratory Technician at University of Pittsburgh, June–July, 2003

Other

- US Citizen
- AMS Member
- Beginner reading and speaking ability in French
- Familiarity with Mathematica, C++, HTML, and LaTeX