CURRICULUM VITAE

Gregory E. Knese

CONTACT INFORMATION

Washington University in St. Louis
Department of Mathematics
One Brookings Drive
Campus Box 1146 St. Louis, MO 63130

Email: geknese@wustl.edu
Web: math.wustl.edu/~geknese
ORCID: 0000-0002-9484-2537

EMPLOYMENT

Professor, Washington University in St. Louis, 2023—present.

Associate Professor, Washington University in St. Louis, 2016-2023.

Assistant Professor, Washington University in St. Louis, 2013-2016.

Assistant Professor, University of Alabama, 2010-2013.

Visiting Assistant Professor, University of Califorina, Irvine, 2007-2010.

EDUCATION

Ph. D. in Mathematics, Washington University in St. Louis, St. Louis, MO (May 2007).

B.S. in Mathematics, Truman State University, Kirksville, MO (May 2002)

RESEARCH INTERESTS

Operator theory, complex analysis, and harmonic analysis.

SUBMITTED FOR PUBLICATION

1. *Testing von Neumann inequalities with nilpotent matrices*, submitted 2025. 11 pages. Available at https://arxiv.org/abs/2501.15671.

2. *Three radii associated to Schur functions on the polydisk*, submitted 2024. 16 pages. Available at https://arxiv.org/abs/2410.21693.

3. *Boundary local integrability of rational functions in two variables*, submitted 2024. 61 pages. Available at https://arxiv.org/abs/2404.05042

PUBLICATIONS/ACCEPTED PAPERS

1. *Rational inner functions on the polydisk – a survey*, to appear in SpringerNature volume on Operator Theory. (2024). Available at `https://arxiv.org/abs/2409.14604`.

2. (with K. Bickel, J.E. Pascoe, and A. Sola) *Stable polynomials and admissible numerators in product domains*, to appear in BLMS (2024). Available at `https://arxiv.org/abs/2406.13014`

3. (with K. Bickel, J.E. Pascoe, and A. Sola) *Local theory of stable polynomials and bounded rational functions of several variables*, to appear in Annales Polonici Mathematici (2024). 68 pages. Available at `https://arxiv.org/abs/2109.07507`, `DOI: 10.4064/ap240229-9-9`.

4. *Kummert's approach to realization on the bidisk.* Indiana Univ. Math. J. 70 (2021), no. 6, 2369–2403.

5. *A simple proof of necessity in the McCullough-Quiggin theorem.* Proc. Amer. Math. Soc. 148 (2020), no. 8, 3453–3456.

6. (with E.D. Knese, Keel, Bennert, Moiseev, Grokhovskaya, Dodonov) *An [O III] search for extended emission around AGN with H I mapping: a distant cloud ionized by Mkn 1.* Monthly Notices of the Royal Astronomical Society, vol. 496, (2020), no. 2, 1035–1050.

7. (with Ł. Kosiński, T. Ransford, A. Sola) *Cyclic polynomials in anisotropic Dirichlet spaces.* J. Anal. Math. 138 (2019), no. 1, 23-47.

8. *Extreme points and saturated polyomials.* Illinois J. Math. 63 (2019), no. 1, 47–74.

9. *Global bounds on stable polynomials.* Complex Anal. Oper. Theory 13 (2019), no. 4, 1895–1915.

10. (with Beneteau, Kosinski, Liaw, Seco, Sola) *Cyclic polynomials in two variables.* Trans. Amer. Math. Soc. 368 (2016), no. 12, 8737–8754.

11. *Determinantal representations of semi-hyperbolic polynomials.* Michigan Math. J. 65 (2016), no. 3, 473–487.

12. (with J. Geronimo and P. Iliev) *Polynomials with no zeros on a face of the bidisk.* J. Funct. Anal. 270 (2016), no. 9, 3505–3558.

13. (with K. Bickel) *Canonical Agler decompositions and transfer function realizations.* Trans. Amer. Math. Soc. 368 (2016), no. 9, 6293–6324.

14. *The von Neumann inequality for* 3×3 *matrices.* Bull. Lond. Math. Soc. 48 (2016), no. 1, 53–57.

15. (with J. McCarthy and K. Moen) *Unions of Lebesgue spaces and A_1 majorants.* Pacific J. Math. 280 (2016), no. 2, 411–432.

16. *Integrability and regularity of rational functions.* Proc. Lond. Math. Soc. (3) 111 (2015), no. 6, 1261–1306.

17. (with K. Bickel) *Inner functions on the bidisk and associated Hilbert spaces.* J. Funct. Anal. 265 (2013), no. 11, 2753-2790.

18. (with P.M. Gauthier) *Zero-free polynomial approximation on a chain of Jordan domains.* Ann. Sci. Math. Québec 36 (2012), no 1, 107-112.

19. *Uchiyama's lemma and the John-Nirenberg inequality.* Bull. Lond. Math. Soc. (2013) 45 (4): 683-692.

20. (with J. Geronimo and P. Iliev) *Orthogonality relations for bivariate Bernstein-Szego measures*, in Recent Advances in Orthogonal Polynomials, Special Functions, and Their Applications, Contemporary Mathematics, vol. 578, Amer. Math. Soc., Providence, RI, 2012, pp. 119-131.

21. (with M. Jury and S. McCullough) *Nevanlinna-Pick interpolation on distinguished varieties in the bidisk*, 2012, J. Funct. Anal., 262(9), 3812-3838.

22. (with J. Agler and J.E.McCarthy) *Algebraic pairs of isometries*, 2012, J. Operator Theory, 67(1), 215-236.

23. *Kernel decompositions for Schur functions on the polydisk,* 2011, Complex Analysis and Operator Theory, 5(4), 1093-1111.

24. *Stable symmetric polynomials and the Schur-Agler class.* Illinois Math. J. Vol 55, No 4 (2011), 1603-1620.

25. *A refined Agler decomposition and geometric applications.* Indiana Univ. Math. J. 60 (2011), 1831-1842.

26. *Schur-Agler class rational inner functions on the tridisk*, Proc. Amer. Math. Soc., 139 (2011), 4063-4072.

27. *Rational inner functions in the Schur-Agler class of the polydisk*, Publicacions Matemàtiques, Volume 55, Number 2(2011), 343-357.

28. *Polynomials with no zeros on the bidisk*, 2010, Analysis & PDE, 3(2) 109-149.

29. *Polynomials defining distinguished varieties*, 2010, Trans. Amer. Math. Soc., 362(11) 5635-5655.

30. (with M. Jury and S. McCullough) *Agler interpolation families of kernels*, Operators and Matrices, Vol. 3 (2009) No. 4, 571-587.

31. *Bernstein-Szegő measures on the two dimensional torus*, Indiana Univ. Math. J., **57**, No. 3 (2008), 1353-1376.

32. *Function theory on the Neil parabola*, Michigan Math. J., Vol. 55, Issue 1 (2007), 139-154.

33. *A Schwarz lemma on the polydisk*, Proc. Amer. Math. Soc., **135** (2007), 2759-2768.

GRANTS

2023-2026, NSF analysis grant, "Stable Polynomials, Rational Singularities, and Operator Theory." DMS-2247702.

2020-2022, NSF conference grant, "GPOTS 2021+2022."

June 2019-May 2023, NSF analysis grant, "Operator theory and stable polynomials." DMS-1900816.

2016, NSF conference grant, "International Workshop on Operator Theory and Applications 2016."

August 2014-July 2018, NSF analysis grant, "Harmonic analysis and spaces of analytic functions in several variables." DMS-1363239.

July 2010-June 2014, NSF analysis grant, "Operator related function theory and algebraic varieties." DMS-1048775.

SELECTED CONFERENCES/TALKS

2025

(upcoming) Plenary address. Operator analysis on function spaces. University of Manitoba, Winnipeg. June 13-15, 2025.

2024

AMS sectional meeting. Albany, NY. Special Session: "Special Session on Holomorphic Function Spaces and Operators on Them". Talk title: *Stable polynomials and admissible numerators in product domains.* October 18-19, 2024.

International Workshop on Operator Theory and Applications (IWOTA) 2024. Special session: Multivariable operator theory. August 12-16, 2024.

AMS joint meeting. San Francisco, CA. January 2024. Special session "Complex analysis, operator theory, and real algebraic geometry." Talk title: "Local integrability of rational functions."

2023

Plenary address. Mathematisches Forschungsinstitut Oberwolfach workshop "New directions in real algebraic geometry." March 2023. Talk title: "Local theory of stable polynomials."

2021

Analysis seminar (virtual). Indian Institute of Science, Bangalore, India. October 2021.

Plenary address (virtual). Fields Institute focus program "Analytic Function spaces and their applications." Session "Operators on Function Spaces." October 2021.

International Workshop on Operator Theory and Applications, Lancaster, UK, special session "Complex geometry and operator theory." (virtual) August 2021.

Plenary address (virtual). Banff International Research Station workshop on Multivariable Operator Theory and function spaces in several variables. August 2021.

Plenary address (virtual). International Centre for Mathematical Sciences workshop. "Applied Matrix Probability." Edinburgh, Scotland. July 2021.

2020

AMS/MAA joint meetings, Denver, CO, special session "Advances in Multivariable Operator Theory." January 2020.

2019

Brazos Analysis seminar. Baylor University. Plenary speaker. November 2019.

AMS/MAA joint meetings, Baltimore, MD, special session "Recent progress in Multivariable Operator Theory." January 2019.

2018

AMS sectional meeting, University of Delaware, Newark, DE. September 2018.

AMS sectional meeting, Vanderbilt University, Nashville, TN. April 2018

Erwin Schrödinger Institute workshop, Vienna, Austria. Plenary speaker. March 2018.

2017

International Workshop on Operator Theory and Applications, Chemnitz, Germany, semi-plenary speaker. August 2017.

Brown University, analysis seminar. May 2017.

LMS invited lecture series, Newcastle upon Tyne, England. Plenary speaker. April 2017.

AMS sectional meeting, Bloomington, Indiana, special session "Multivariate Operator Theory and Function Theory." March 2017.

AMS/MAA joint meetings, Atlanta, GA, special session "Operator Theory, Function Theory, and Models." January 2017.

2016

International Symposium on Mathematical Theory of Networks and Systems (MTNS), Minneapolis, MN, invited session "Hyperbolic polynomials." July 2016.

Plenary address. Southeastern Analysis Meeting, University of South Florida, March 2016.

AMS/MAA joint meetings, Seattle, WA, special session "Operators, Function Spaces, and Models." January 2016.

2015

AMS sectional meeting, Chicago, IL, special session "Recent advances in non-commutative analysis." October 2015.

Analysis seminar at Jagiellonian University Department of Mathematics, Krakow, Poland. May 2015

Banff International Research Station workshop "Multivariate Operator Theory." Banff, Canada. April 2015.

Colloquium at University of South Florida, Tampa. March 2015.

AMS/MAA joint meetings special session "Progress in Multivariable Operator Theory" in San Antonio, TX. January 2015.

2014

Midwestern Workshop on Asymptotic Analysis in Fort Wayne, IN. September 2014.

International Centre for Mathematical Sciences workshop "Function theory in several complex variables in relation to modelling uncertainty" in Edinburgh, Scotland. July 2014.

Mathematisches Forschungsinstitut Oberwolfach workshop "Hilbert modules and complex geometry" in Oberwolfach, Germany. April 2014.

AMS sectional meeting in Knoxville, TN. March 2014.

AMS/MAA joint meetings in Baltimore, MD. Special session on multivariable operator theory. January 2014.

2013

International Workshop on Operator Theory and Applications in Bangalore, India. Special session on multivariable operator theory. December 2013.

SIAM annual meeting in San Diego, CA. Minisymposium on multivariable orthogonal polynomials. July 2013.

AMS sectional meeting at the University of Mississippi, Oxford, MS. March 2013.

AMS/MAA joint meetings in San Diego, CA. Special session on multivariable operator theory. January 2013.

2012

Georgia Tech analysis seminar. August 2012.

Recent Advances in Harmonic Analysis and Spectral Theory at Texas A& M. August 2012.

Workshop on the corona problem: connections between operator theory, function theory and geometry. Fields Institute, Toronto, Canada. June 2012.

AMS/MAA joint meetings in Boston, MA. January 2012.

2011

AMS sectional meeting in Ithaca, NY (Cornell University). September 2011.

International Workshop on Operator Theory and Applications, Seville, Spain. Special session on "Multivariable operator theory." June 2011.

2010

AMS sectional meeting in Richmond, VA. November 2010.

Georgia Tech analysis seminar. October 2010.

Banff Workshop New Perspectives in Univariate and Multivariate Orthogonal Polynomials. October 2010.

Southeastern Analysis Meeting (plenary speaker) at Georgia Tech. March 2010.

2009

International Workshop on Operator Theory and Applications, Guanajuato, Mexico, "Multivariable operator theory" special session. September 2009.

2008

Southern California Functional Analysis Seminar (main speaker) at Claremont McKenna College. November 2008.

Claremont McKenna College, Analysis seminar. October 2008.

International Workshop on Operator Theory and Applications, William and Mary College, "Matrix completion problems" special session. July 2008.

AMS Spring Western Sectional meeting, Claremont McKenna College. May 2008.

Georgia Tech Analysis seminar. April 2008.

University of Florida, Gainesville, Analysis seminar. April 2008.

University of Florida, Gainesville, Colloquium. April 2008.

2007

University of California, San Diego, Analysis seminar. November 2007.

University of Illinois, Urbana-Champaign, Analysis seminar. March 2007.

WORKSHOPS

2025. (upcoming) American Institute of Mathematics workshop. "The geometry of polynomials in combinatorics and sampling." March 2025.

2023. Mathematisches Forschungsinstitut Oberwolfach, "New Directions in Real Algebraic Geometry." March 2023.

2021. Banff International Research Station workshop on Multivariable Operator Theory and function spaces in several variables. (virtual) August 2021.

2018. Erwin Schrödinger Institute, "Mathematical challenges of structured function systems." March 2018.

2017. Mathematisches Forschungsinstitut Oberwolfach, "Real Algebraic Geometry with a view toward moment problems and optimization." March 2017.

2014. Mathematisches Forschungsinstitut Oberwolfach, "Hilbert Modules and Complex Geometry." April 2014.

2014. American Institute of Mathematics workshop "Beyond Kadison-Singer: paving and consequences" in Palo Alto, California. December 2014.

2013. Clemson University. NSF/CBMS regional conference: Uncertainty principles in harmonic analysis: gap and type problems. August 2013.

2012. Fields Institute, Workshop on the corona problem. Toronto, Canada. June 2012.

2011. American Institute of Mathematics workshop "Stability, hyperbolicity, and zero localization of functions" in Palo Alto, California. December 2011.

2010. Banff International Research Station workshop on Multivariable Operator Theory in Banff, Alberta, Canada. August 2010.

2008. Fields Institute, Workshop on Recent Advances in Operator Theory and Function Theory in Toronto, Canada. January 2008.

TEACHING

Washington University

(Currently) Honors Mathematics II. Spring 2025.

Honors Mathematics I. Fall 2024.

Foundations for Higher Mathematics. Spring 2024.

Undergraduate topics course Analytic combinatorics. Fall 2018, Spring 2021, Fall 2023.

Graduate topics course: analysis of Dirichlet series. Spring 2023.

Introduction to Combinatorics. Fall 2023.

Freiwald Scholars undergraduate research seminar. Spring 2022.

Graduate topics course on Analytic combinatorics in several variables. Spring 2022.

Undergraduate topics course on Mathematical geodesy. Fall 2021.

Graduate topics course on Riemann surfaces, Fall 2019.

Undergraduate Differential equations. Fall 2019.

Graduate topics course on Reproducing kernel Hilbert space. Spring 2019.

Undergraduate Partial Differential Equations. Fall 2018.

Graduate topics course Function theory on the polydisk. Spring 2018.

Graduate Geometry. Fall 2016.

Calculus of Several Variables. Spring 2016.

Graduate Complex Analysis I & II. 2015-16. 2020-21

Measure theory and Functional Analysis II. Spring 2015, Spring 2017, Spring 2018.

Measure theory and Functional Analysis I. Fall 2014, Fall 2017.

Matrix Algebra. Fall 2013, Fall 2004.

Calculus I. Summer 2004

University of Alabama

Graduate Real Analysis II. Spring 2013.

Calculus II. Spring 2013, Spring 2012, Fall 2010.

Graduate Real Analysis I. Fall 2012.

Honors Calculus I. Fall 2012.

Complex Calculus (graduate course). Spring 2012.

Advanced Linear Algebra. Fall 2011.

Abstract Algebra I (graduate course). Fall 2011.

Calculus I. Spring 2011.

Advanced Calculus. Spring 2011.

University of California, Irvine

4th quarter Calculus. Spring 2009.

Discrete math for computer scientists. Winter 2009.

Math for economists. Fall 2008, Fall 2009, Winter 2010, Spring 2010.

Elementary analysis. Fall 2008.

3rd quarter Calculus. Winter 2008, Spring 2008, Winter 2009.

2nd quarter Calculus. Fall 2007.

Student supervision

Fall 2022-May 2023. Honors thesis mentoring for Jerry Li.

Summer 2022. Undergraduate research with Jerry Li, Mingzhen Li, Cyrus Salmassi through the Freiwald Scholars program.

2018-May 2022. Ph.D. student Jeet Sampat (now postdoc at University of Manitoba).

Spring-Summer 2015. Washington University undergraduate Anna Gautier. Advanced Research Training for Undergraduates program.

Fall 2011-Fall 2012. University of Alabama undergraduate Douglas Weathers. Undergraduate research project.

Summer 2011-Summer 2012. University of Alabama undergraduate Ross Walden. Undergraduate research project.

Spring 2011. University of Alabama undergraduate Joseph Tidmore. Independent study.

SERVICE

Professional service

2019-present. Member of the editorial board for London Mathematical Society journals: the Bulletin of the LMS and the Journal of the LMS.

2023-24. Organizer for multivariable operator theory conference for 60th birthday of Professor John E. M^{c}Carthy. June 10-14, 2024.

2022-23. Organizer for Two-day Conference on Partial Differential Equations and Complex Analysis (To celebrate the 70th Birthday of Steven G. Krantz). Conference May 22-23, 2023.

2021. Special session organizer for IWOTA 2021 in Lancaster, UK.

2019-May 2022. Organizer for the Great Plains Operator Theory Symposium (GPOTS) held at WU May 2022.

2016-present. Member of the steering committee for the International Workshop on Operator Theory and Applications. Manager of the IWOTA youtube channel.

2016. Lead organizer for the International Workshop on Operator Theory and Applications held at WU, July 18-22, 2016.

2012. Organizer of the Southeastern Analysis Meeting held at the University of Alabama in Spring 2012.

NSF Panelist. 2015, 2019, 2024.

Reviewer for Mathscinet math reviews. September 2007-present.

Referee for papers submitted to the following math journals: Transactions of the AMS, J. Math. Anal. Appl., Proceedings of the AMS, Complex Analysis and Operator Theory, Journal of Functional Analysis, IMRN, Proceedings of the LMS, Memoirs of the AMS, American Mathematical Monthly, Journal of Geometric Analysis, Canadian Journal of Math, Integral Equations and Operator Theory, SIAM journal on Applied Algebra and Geometry, September 2007-present.

Departmental/University service

Director of Graduate Studies for Department of Mathematics. July 2022-present.

Lead mentor for WU Freiwald Scholars program. Spring-Summer 2022.

WU Math hiring committee. Fall 2014, Fall 2017, Fall 2018-Spring 2019, Fall 2019, Fall 2022.

WU College of Arts & Sciences curriculum review committee. Spring 2018, Fall 2018.

WU Undergraduate committee. 2016-17.

WU Math Colloquium committee. 2015-16.

WU Calculus curriculum committee. Fall 2013-Spring 2014.

WU Math graduate committee. Fall 2013-Spring 2015, Fall 2022.

UA job hiring committees. Fall 2010-Spring 2012.

Judge of oral presentations for University of Alabama undergraduate research conference. April 2011, April 2012.

Community Involvement/Outreach

Speaker/presenter at Washington University Math Circles program for middle/high school students. October 2024, February 2024, April 2021, February 2015, September 2014, September 2013.

Contributor to "Snapshots of modern mathematics from Oberwolfach" with a short general audience paper *Operator theory and the singular value decomposition*. July 2014.

Volunteer for Alabama high school math contests. October 2010, Spring 2012.

Keynote Speaker, Judge, and volunteer for MathCounts middle school math contest held at UC Irvine. March 2008, February 2009, March 2010.