Joseph Vandehey

Curriculum Vitae

University of Texas at Tyler
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POSITIONS HELD

University of Georgia at Athens

Postdoctoral Research and Teaching Associate — Fall 2013 – Spring 2016

The Ohio State University

Zassenhaus Assistant Professor — Fall 2016 – Spring 2019

University of Texas at Tyler

Assistant Professor — Fall 2019 –

EDUCATION

University of Oregon

Bachelor of Science, Mathematics — 2005 – 2008

University of Illinois at Urbana-Champaign

Ph. D. program, Mathematics — 2008 – 2013

RESEARCH INTERESTS

Number Theory and Ergodic Theory

Normal numbers, continued fractions and their applications to hyperbolic geometry, radix expansions and their variants, symbolic dynamics, Diophantine approximation, asymptotic analysis, exponential sums

PAPERS

[1] Containment in (s,t)-core partitions 2008

Undergraduate thesis at the University of Oregon under the direction of Professor Marie Vitulli

[2] On Multiplicative Functions with Bounded Partial Sums 2012

Integers **12** no. 4, 741–755

[3] On certain statistical properties of continued fractions with even and with odd partial quotients (with F. Boca) 2012

Acta Arithmetica **156** no. 3, 201–221

[4] The normality of digits in almost constant additive functions 2013

Monatshefte für Mathematik **171** no. 3-4, 481–497

[5] On non-intersecting arithmetic progressions (with R. de la Bretèche and K. Ford) 2013
Acta Arithmetica **157**, 381-392

[6] On an incomplete argument of Erdős on the irrationality of Lambert series 2013
#A58 *Integers* **13**

[7] Error term improvements for van der Corput transforms 2014
Quaterly Journal of Mathematics **65**, no. 4, 1461–1502.

[8] A simpler normal number construction for simple Lüroth series 2014
The Journal of Integer Sequences Article 14.6.1, Vol. 17

[9] Some normal numbers generated by arithmetic functions (with P. Pollack) 2015
Canadian Mathematical Bulletin **58**, no. 1, 160–173

[10] Continued fractions on the Heisenberg group (with A. Lukyanenko) 2015
Acta Arithmetica **167**, 19-42

[11] Besicovitch, Bisection, and the normality of 0.(1)(4)(9)(16)(25)... (with P. Pollack) 2015
American Mathematical Monthly **122**, no. 8, 757–765

[12] Lagrange's Theorem for continued fractions on the Heisenberg group 2015
Bulletin of the London Mathematical Society **47**, no. 5, 866–882

[13] Normality preserving operations for Cantor series expansions and associated fractals part II (with D. Airey and B. Mance) 2015
New York Journal of Mathematics **21**, 1311–1326

[14] Diophantine properties of continued fractions on the Heisenberg group 2016
International Journal of Number Theory **12**, no. 2, 541–560

[15] Continued fraction normality is not preserved along arithmetic progressions (with B. Heersink) 2016
Archiv der Mathematik **106**, no. 4, 363–370

[16] New normality constructions for continued fraction expansions 2016
Journal of Number Theory **166**, 424–451

[17] Normal number constructions for Cantor series with slowly growing bases (with D. Airey and B. Mance) 2016
Czechoslovak Mathematical Journal **66(141)**, no. 2, 465–480

[18] Absolutely abnormal, continued fraction normal numbers 2016
Bulletin of Australian Mathematical Society **94**, no. 2, 217–223

[19] Non-trivial matrix actions preserve normality for continued fractions 2017
Compositio Mathematica **153**, no. 2, 274–293

[20] Uncanny subsequence selections that generate normal numbers 2017
Uniform Distribution Theory **12**, no. 2, 65–75

[21] On the binary digits of $\sqrt{2}$ 2018
#A30 *Integers* **18**

[22] Differencing methods for Korobov-type exponential sums 2019
Journal d'Analyse Mathématique **138**, no. 1, 405–439

[23] Towards a sharp converse of Wall's Theorem on arithmetic progressions 2019
Pacific Journal of Mathematics **300**, no. 2, 499–509

[24] A hot spot proof of the generalized Wall's theorem (with V. Bergelson)
(to appear in *American Mathematical Monthly*)

[25] Squares in polynomial product sequences (with P. Spiegelhalter)
Preprint: `http://arxiv.org/abs/1107.1730` (submitted)

[26] On the joint normality of certain digit expansions
Preprint: `http://arxiv.org/abs/1408.0435` (submitted)

[27] Intrinsic Diophantine approximation in Carnot groups and in the Siegel model of the Heisenberg group (with A. Lukyanenko)
Preprint: `http://arxiv.org/abs/1510.06033` (submitted)

[28] Ergodicity of Iwasawa continued fractions via markable hyperbolic geodesics (with A. Lukyanenko)
Preprint: `https://arxiv.org/abs/1805.09312` (submitted)

[29] Calculations of the invariant measure for Hurwitz continued fractions (with G. Hiary)
Preprint: `http://arxiv.org/abs/1805.10151` (submitted)

[30] A proof of the infinitude of primes via continued fractions
(submitted)

SELECTED PRESENTATIONS

Integers Conference 2011 (University of West Georgia) October 26, 2011
'On Multiplicative Functions with Bounded Partial Sums'

UGA Math Club (University of Georgia at Athens) October 16, 2013
'The abnormality of normal numbers'
Video link: `http://www.youtube.com/watch?v=G3MwnMo7tio`

Integers Conference 2013 (University of West Georgia) October 26, 2013
'Combinatorial methods in normal number proofs'

2014 Midwest Number Theory Conference for Graduate Students and Recent PhDs (University of Illinois at Urbana–Champaign) June 3, 2014
'Heisenberg points with periodic continued fraction expansions'

Palmetto Number Theory Series XXII (South Carolina State University) September 6, 2014
'Periodic multi-dimensional continued fractions'

Illinois Number Theory Conference (University of Illinois at Urbana-Champaign) August 13-14, 2015
'Comparing different types of normality'

UGA Math Club (University of Georgia at Athens) September 3, 2015
'The great mechanical planetarium'

Radical Pi (The Ohio State University) September 21, 2016
'Continued fractions and the great mechanical planetarium'

Integers Conference 2016 (University of West Georgia) October 7, 2016

'Breaking decimal normality with continued fractions'

Invited Talks

Spring Southeastern Sectional Meeting, Special Session on Modern Methods in Analytic Number Theory March 2, 2013

'Exponential sums, the van der Corput transform, and Cornu spirals'

University of South Carolina, Number Theory Seminar October 4, 2013

'Continued fractions on the Heisenberg group'

University of North Texas, RTG Logic and Dynamics Seminar November 22, 2013

'Normal number construction for Lüroth series'

The Ohio State University, Number Theory Seminar February 3, 2014

'The unexpected strength of continued fractions on the Heisenberg group'

Georgia Southern University, Colloquium November 14, 2014

'The unexpected strength of continued fractions on the Heisenberg group'

Spring Southeastern Sectional Meeting, Special Session on Analytic Methods in Elementary Number Theory March 29, 2015

'New constructions of normal continued fraction expansions'

Central Fall Sectional Meeting, Special Session on Metric Spaces: Geometry, Group Theory, and Dynamics October 4, 2015

'Continued fractions and the Heisenberg group'

University of Illinois, Number Theory Seminar Oct. 13, 2016

'Analyzing rationals by simpler rationals'

Workshop on "Normal numbers: arithmetic, computational and probabalistic aspects" at the Erwin Shrödinger International Institute for Mathematics and Physics Nov. 16, 2016

'Skew-products, automata, and normality'

Eastern Illinois University, Number Theory Seminar Oct. 6, 2017

'Normality vs. determinism'

University of Illinois, Number Theory Seminar Oct. 11, 2018

'Higher-dimensional frontiers in continued fractions'

University of Illinois, Graduate Student Number Theory Seminar Oct. 11, 2018

'Combinatorial methods for ergodic proofs'

TEACHING EXPERIENCE

Zassenhaus Assistant Professor, The Ohio State University

Math 4551: Vector Analysis	Fall 2016
Math 4551: Vector Analysis	Spring 2017
Math 4573: Elementary Number Theory	Spring 2017
Math 3345: Foundations of Higher Mathematics	Fall 2017
Problem-solving seminar	Fall 2017
Math 5152: Introduction to Number Theory	Spring 2018
Math 1172: Engineering Mathematics A	Fall 2018
Problem-solving seminar	Fall 2018
Math 4573: Elementary Number Theory	Spring 2019

Postdoctoral Research and Teaching Associate, University of Georgia at Athens

Math 2250: Calculus I	Fall 2013
Math 2260: Calculus II	Spring 2014
Math 3200: Introduction to Higher Mathematics	Spring 2014
Math 2250: Calculus I	Fall 2014
Math 4400/6400: Number Theory	Spring 2015
Math 8440: Number Theory and Dynamical Systems	Fall 2015
Math 2260: Calculus II	Spring 2016

Teaching Assistant, University of Illinois at Urbana-Champaign

Math 221: Calculus I	Fall 2008
Math 117: Elementary Mathematics	Spring 2009
Math 241: Calculus III - Calculus and Mathematica ($\star$, †)	Fall 2009
Math 241: Calculus III ($\star$)	Spring 2010
Math 220: Calculus I	Fall 2010
Math 231: Calculus II ($\star$)	Spring 2011
Math 220: Calculus I (†)	Fall 2011

($\star$) Made UIUC's "List of teachers ranked as excellent" based on exceptional student evaluations.
(†) Stand-alone course

ADDITIONAL ACTIVITIES

Supervisor for Illinois Geometry Lab group 2012–2013

Organizer for Midwest Number Theory Conference for Graduate Students and Recent Ph.D.s Fall 2012

UGA Math Camp Summer 2014

Organizer for special session on "Connections in Number Theory" at AMS Southeastern Sectional Meeting Fall 2014

YouTube channel: "Math and Tea" Summer 2016–

Coordinator for the Ohio State University Putnam team 2017–2018

Teacher at the Ross Mathematics Program for pre-college students 2017–2019

Organizer for special session on "Geometry and Dynamics of Continued Fractions" at the Joint Mathematics Meetings January 2019

HONORS AND AWARDS

University of Illinois

Bateman Fellowship	Spring 2012
Bateman Prize in Number Theory	Spring 2013
Department TA Instructional Award	Spring 2013