Matthew P. Young

Department Address:
Department of Mathematics
Texas A&M University
College Station, TX 77843-3368
979-845-7862
http://www.math.tamu.edu/~myoung
mpyoung@tamu.edu

Research Interests: Analytic number theory, automorphic forms, L-functions, elliptic curves, random matrix theory.

Education:

Ph.D. in Mathematics, May 2004; advisor: Henryk Iwaniec.
Rutgers University, New Brunswick, New Jersey, *9/99-5/04*.

Bachelor of Science in Mathematics
University of Minnesota, Minneapolis, Minnesota, *9/96-6/99*.
Honors Program; graduated *summa cum laude*.

Publications:

Vanishing of Quartic and Sextic Twists of L-functions. Submitted. https://arxiv.org/abs/2301.05329. Joint with Jennifer Berg and Nathan Ryan.

The large sieve for self-dual Eisenstein series of varying levels. Submitted. https://arxiv.org/abs/2208.03358

On the spectral large sieve inequality for symmetric-squares. Submitted. https://arxiv.org/abs/2205.07754

Reciprocity and the kernel of Dedekind sums. Accepted by Research in Number Theory. https://arxiv.org/abs/2110.12269. Joint with Alexis LaBelle and Emily Van Bergeyk.

An improved spectral large sieve inequality for $SL_3(Z)$. Acta Arith. 204 (2022), no. 2, 151–164.

Moments and hybrid subconvexity for symmetric-square L-functions. Published online by J. Inst. Math. Jussieu. https://arxiv.org/abs/2009.08419. Joint with Rizwanur Khan.

The kernel of newform Dedekind sums, J. Number Theory 223 (2021), 53–63. Joint with Evuilynn Nguyen and Juan Ramirez.

Quantum unique ergodicity for Eisenstein series in the level aspect. Comm. Math. Phys. 385 (2021), no. 1, 227–266. Joint with Jiakun Pan.

The fourth moment of Dirichlet L-functions along a coset and the Weyl bound, Duke Math. J. 172 (2023), no. 10, 1879–1960.

Dedekind sums arising from Newform Eisenstein series, Int. J. Number Theory 16 (2020), no. 10, 2129–2139. Joint with Tristie Stucker and Amy Vennos.

The Weyl bound for Dirichlet L-functions of cube-free conductor, Ann. of Math. (2) 192 (2020), no. 2, 437–486. Joint with Ian Petrow.

Equidistribution of Eisenstein series on geodesic segments, Adv. Math. 340 (2018), 1166–1218.

Explicit calculations with Eisenstein series, J. Number Theory 199 (2019), 1–48.

Publications continued

Oscillatory integrals with uniformity in parameters, J. Théor. Nombres Bordeaux 31 (2019), no. 1, 145–159. Joint with Eren Mehmet Kiral and Ian Petrow.

Kloosterman sums and Fourier coefficients of Eisenstein series, Ramanujan J. 49 (2019), no. 2, 391–409. Joint with Eren Mehmet Kiral.

The fifth moment of modular L-functions, J. Eur. Math. Soc. (JEMS) 23 (2021), no. 1, 237–314. Joint with Eren Mehmet Kiral.

A generalized cubic moment and the Petersson formula for newforms, Math. Ann. 373 (2019), no. 1-2, 287–353. Joint with Ian Petrow.

Sign changes of the Eisenstein series on the critical line, Int. Math. Res. Not. IMRN 2019, no. 3, 641–672. Joint with Junehyuk Jung.

Zeros of certain combinations of Eisenstein series, Mathematika 63 (2017), no. 2, 666–695. Joint with Sarah Reitzes and Polina Vulakh (Summer 2015 REU students).

Bilinear forms with GL_3 Kloosterman sums and the spectral large sieve. Int. Math. Res. Not. IMRN 2016, no. 21, 6453–6492.

A note on the sup norm of Eisenstein series, 8 pages, to appear in Quarterly Journal of Mathematics.

The distribution of central values of elliptic curve L-functions, J. Number Theory 156 (2015), 15-20. Joint with Dustin Hinkel.

The number of solutions to Mordell's equations in constrained ranges, Mathematika 61 (2015), no. 3, 708–718.

Weyl-type hybrid subconvexity bounds for twisted L-functions and Heegner points on shrinking sets, J. Eur. Math. Soc. (JEMS) 19 (2017), no. 5, 1545–1576.

Rankin-Selberg L-functions and the reduction of CM elliptic curves Res. Math. Sci. 2 (2015), Art. 22, 23 pp. Joint with S.C.-Liu and R. Masri.

Zeros of the weight 2 Eisenstein series J. Number Theory 143 (2014), 320–333. Joint with Rachael Wood (Summer 2013 REU student).

The quantum unique ergodicity conjecture for thin sets, Adv. Math. 286 (2016), 958–1016.

The L^2 restriction norm of a Maass form on $SL_{n+1}(Z)$ Math. Ann. 371 (2018), no. 3-4, 1301–1335. Joint with Xiaoqing Li and Sheng-Chi Liu. `http://arxiv.org/abs/1212.4002`

Subconvexity and equidistribution of Heegner points in the level aspect Joint with Sheng-Chi Liu and Riad Masri. Compos. Math. 149 (2013) no. 7, 1150–1174.

The third moment of quadratic Dirichlet L-functions. Selecta Math. (N.S.) 19 (2013), no. 2, 509–543.

Distribution of mass for holomorphic cusp forms. Duke Math. J. 162 (2013), no. 14, 2609–2644. Joint with Valentin Blomer and Rizwanur Khan.

Growth and nonvanishing of restricted Siegel modular forms arising as Saito-Kurokawa lifts. Amer. J. Math. 136 (2014), no. 1, 165–201. Joint with Sheng-Chi Liu.

Additive twists of Fourier coefficients of symmetric-square lifts. Joint with Xiaoqing Li. J. Number Theory 132 (2012), no. 7, 1626–1640.

The L^2 restriction norm of a GL_3 Maass form. Joint with Xiaoqing Li. Compositio Math. **148** (2012), 675–717.

The prime geodesic theorem. Joint with Soundararajan. J. Reine Angew. Math. 676 (2013), 105–120.

Publications continued

A short proof of Levinson's theorem. Arch. Math. (Basel) 95 (2010), no. 6, 539–548.

More than 41% of the zeros of the zeta function are on the critical line. Joint with Hung Bui and Brian Conrey. Acta Arith. 150 (2011), no.1, 35–64.

The second moment of quadratic twists of modular L-functions. J. Eur. Math. Soc. (JEMS) 12 (2010), no. 5, 1097–1116. Joint with Soundararajan.

The second moment of $GL(3) \times GL(2)$ L-functions, integrated. Adv. Math. 226 (2011), no. 4, 3550–3578.

The second moment of $GL(3) \times GL(2)$ L-functions at special points. Math. Ann. 356 (2013), no. 3, 1005–1028.

The first moment of quadratic Dirichlet L-functions, Acta Arithmetica 138 (2009), no. 1, 73-99.

Mean values with cubic characters, Journal of Number Theory 130 (2010), no. 4, 879–903. Joint with Stephan Baier.

The reciprocity law for the twisted second moment of Dirichlet L-functions, Forum Math. 23 (2011), no. 6, 1323–1337.

Moments of the critical values of families of elliptic curves, with applications, Canad. J. Math. 62 (2010), no. 5, 1155–1181.

The twisted fourth moment of the Riemann zeta function, J. Reine Angew. Math. 641 (2010), 203–236. Joint with Chris Hughes.

The fourth moment of Dirichlet L-functions, Ann. of Math. (2) 173 (2011), no. 1, 1–50.

Analytic number theory and ranks of elliptic curves, Ranks of elliptic curves and random matrix theory, 71–91, London Math. Soc. Lecture Note Ser., 341, Cambridge Univ. Press, Cambridge, 2007.

On the nonvanishing of elliptic curve L-functions at the central point, Proc. London Math. Soc. (3) 93 (2006), no. 1, 1–42.

Lower-order terms of the 1-level density of families of elliptic curves, Int. Math. Res. Not., 10 (2005), 587-633.

Low-lying zeros of families of elliptic curves, J. Amer. Math. Soc. 19 (2006), no. 1, 205–250.

Random matrix theory and families of elliptic curves, Ph.D. thesis, Rutgers University, 2004.

External funding:

National Science Foundation DMS-2302210, $245,636 *9/23-8/26*.

National Science Foundation DMS-2001306, $181,279, *9/20-8/23*.

National Science Foundation DMS-1702221, $158,997, *9/17-8/20*.

National Science Foundation DMS-1401008, $132,706, *9/14-8/17*.

National Science Foundation DMS-1101261, $129,996, *9/11-8/14*.

National Science Foundation DMS-0758235, $120,000, *9/08-8/11*.

PhD Students:

Yung-Chieh Hsieh, *Expected PhD: 2026*

Agniva Dasgupta, *Expected PhD: 2024*

Matthew Kroesche, *Expected PhD: 2024*

Soumendra Ganguly, *PhD awarded: 2023*

Bradford Garcia, *PhD awarded: 2022*

Jiakun Pan, *PhD awarded: 2020*

Awards and Honors:

Member, Institute for Advanced Study, *Spring 2010, Fall 2014.*

National Science Foundation Postdoctoral Fellowship, *8/04-8/07.*

Clay Mathematics Institute Liftoff Fellow, *6/04.*

Rutgers University and Louis Bevier Research Fellowship, *9/03-5/04.*

Excellence Fellowship for Graduate Students at Rutgers, *9/02-5/03.*

VIGRE Fellow, *9/99-5/01.*

Recent Teaching:

Department of Mathematics, Texas A&M University
Analytic theory of L-functions, Fall 2019 **Number theory**, Fall 2016, Spring 2019, Spring 2021 **Linear algebra**, Spring 2016. **Analysis**, Spring 2015 **Analytic Number Theory**, Spring 2014
Calculus II, Spring 2014
Complex analysis, Fall 2013, Fall 2015
Calculus I, Spring 2013, 2017, 2019
Algebraic number theory, Spring 2013, Fall 2020
Linear algebra (two sections), Fall 2012
Differential equations, Fall 2011,
Multivariable Calculus, Fall 2011,
Fourier series and wavelets, Spring 2011,
Linear algebra, Fall 2009
Modular forms, Spring 2009, 2017, Fall 2021
Modern algebra II, Spring 2009
Modern algebra I, Fall 2008,
Analytic Number Theory, Spring 2008, Fall 2010, Spring 2014, 2020, 2022
Cryptography, Fall 2007, Fall 2010, Spring 2018, Fall 2018

Mentorship:

REU Mentor at the Research Experience for Undergraduates, Summers 2013-2023, at Texas A&M University. I mentored 2-5 REU students each summer.
Undergraduate research mentor Various undergraduate students at Texas A&M University, including: Preston Tranbarger (2021–present), Kevin Le (2022–present), William Frendreiss (2022–2023), and others.
Regeneron Science Fair mentor Sammy Shankar, student at A&M Consolidated High School.

Invited Lecture Series:

Summer School on L-functions: Open problems and Current Methods, *Lecture series*, Hausdorff Center for Mathematics, June 2018.

Summer School and Conference on Random Matrices and Number Theory, *Lecture series* on elliptic curves and moments of L-functions, University of Rochester, June 2006.

Outreach and public lectures:

Math Circle given at the Texas A&M math circle, spring 2013 (twice).

Cryptography mini-course given at the Texas A&M SEE-Math program, summer 2012. Co-organized with Riad Masri and Sheng-Chi Liu.

Cryptography mini-course given at the Texas A&M SEE-Math program, summer 2009. Co-organized with Matt Papanikolas.

Codes and Secrets public lecture presented at the Texas A&M Math mini-fair, spring 2009.

Codes and Secrets public lecture presented at the Texas A&M SEE-Math open house, summer 2009.

Selected Seminar Talks:

NB: I have not kept this list updated, but I have continued to give talks regularly.

Conference talk MSRI conference on Analytic Number Theory, May 2017.

Conference talk ICERM conference on Computational Aspects of L-functions, November 2015.

Seminar talk Rice number theory seminar, October, 2015.

Conference talk presented at the Banff Conference Center conference on the trace formula and families of automorphic forms, December 2014.

Seminar presented at the Columbia/CUNY/NYU number theory seminar, Fall 2014

Seminar presented at the Brown number theory seminar, Fall 2014

Seminar presented at the IAS/Princeton number theory seminar, Fall 2014

Seminar presented at the Rutgers number theory seminar, Fall 2014

Seminar presented at the Ohio State number theory seminar, Fall 2014

Conference talk presented at Automorphic Forms and Arithmetic at Göttingen, Germany, February 2014.

Seminar presented at the Northwestern number theory seminar, May 2013.

Conference talk presented at the AMS Southeastern sectional meeting on analytic number theory, Oxford MS, March 2013.

Conference talk presented at PANTS, Columbia, SC, November 2012.

Conference talk presented at Heath-Brown's birthday conference, Oxford, UK, September 2012.

Conference talk presented at conference: Noncommutative Geometry: Multiple Connections, at Ohio State University, May 2012.

Seminar presented at the conference on analytic theory of automorphic forms, Oberwolfach, September 2011.

Seminar presented at the Stanford number theory seminar, May 2011.

Seminar presented at the Stanford number theory seminar, November 2010.

Seminar presented at the Canadian Number Theory Association, July 2010.

Seminar presented at the joint Princeton/Institute for Advanced Study Number Theory Seminar, November 2009.

Seminar presented at the Quebec-Vermont number theory seminar, February 2009.

Selected Seminar Talks:

Seminar presented at the Joint Meetings special session on Automorphic Forms, January 2009.

Seminar presented at the University of Texas Number Theory Seminar, December 2008.

Seminar presented at the Canadian Number Theory Association X Meeting, University of Waterloo, July, 2008.

Seminar presented at the Automorphic Forms Workshop, Texas A&M University, March, 2008.

Seminar presented at the Texas A&M Number Theory Seminar, October 2007.

Seminar presented at the Texas A&M Number Theory Seminar, March 2007.

Research Colloquium, University of Missouri, February 2007.

Research Colloquium, Georgia Tech University, February 2007.

Research Colloquium, Texas A&M University, February 2007.

Research Colloquium, Vanderbilt University, January 2007.

Seminar presented at the joint American Institute of Mathematics/Stanford Number Theory Seminar, Palo Alto, California, October 2006.

Seminar presented at the University of California, Los Angeles Number Theory Seminar, November 2005.

Seminar presented at the University of Illinois Number Theory Seminar, November 2005.

Seminar presented at the University of Michigan Number Theory Seminar, November 2005.