

EDUARDO DUEÑEZ

Associate Professor of Mathematics at The University of Texas at San Antonio

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eduenuez

EDUCATION

Ph.D. in Mathematics

Princeton University

2001

Thesis advisor: Peter Sarnak.

B.Sc. in Mathematics

University of Guanajuato, Mexico

1996

PROFESSIONAL EMPLOYMENT

Research Consultant

Gibran.ai (AI startup; seed funding from Together Fund)

2025 – 2026

Full-time research consulting, June-December 2025.

Associate Professor

The University of Texas at San Antonio

2011 – Present

Assistant Professor

The University of Texas at San Antonio

2005 – 2011

Presidential Fellow

The University of Texas at San Antonio

2004 – 2005

J. J. Sylvester Assistant Professor

The Johns Hopkins University

2002 – 2004

Research Fellow

American Institute of Mathematics, Palo Alto

2001

RESEARCH AWARDS & GRANTS

NSF Grant: “Model Theory and Ergodic Theorems” (2015 – 2019)
Co-PI with José N. Iovino.

AMS/Tensor-SUMMA Grant (2007 – 2008)
Supported UTSA’s Problem-Solving Seminar.

RESEARCH INTERESTS

My research revolves around analysis in a broad sense. I have worked on random matrix theory (Dyson’s “Three-fold Way”; linear group ensembles) and number theory (zeros of L-functions); nowadays, my research is on the foundations of analysis and probability, as well as both theoretical and applied aspects of real-valued computing.

Recent and current research is on foundations of analysis from the perspective of real-valued and other continuous logics, including:

- Measure, integration, probability, and information theory
- Real-valued computability (deterministic, randomized, and quantum)
- Statistical/machine learning and AI foundations

REFEREED PUBLICATIONS

1. E. Dueñez, A. S. Hamakiotes, S. J. Miller. *Sums of Powers by L'Hospital's Rule*. Fibonacci Quart. **63**:3 (2025) 603–613.
2. Xavier Caicedo, Eduardo Dueñez, José N. Iovino. *Metastable convergence and logical compactness*. Beyond First Order Model Theory, Volume II, CRC Press, Boca Raton, FL (2023) 3–41.
3. Eduardo Dueñez, José N. Iovino. *Model theory and metric convergence II: Averages of unitary polynomial actions*. Contemp. Math. **775** (2021) 85–114.
4. Eduardo Dueñez, José N. Iovino. *Model theory and metric convergence I: Metastability and dominated convergence*. Beyond First Order Model Theory, Volume I, CRC Press, Boca Raton, FL (2017) 131–187.
5. E. Dueñez, D. K. Huynh, J. P. Keating, S. J. Miller, N. C. Snaith. *A Random Matrix Model for Elliptic Curve L -functions of Finite Conductor*. Journal of Physics A: Mathematical and Theoretical **45**:11 (2012) 115207 (32 pp).
6. E. Dueñez, D. K. Huynh, J. P. Keating, S. J. Miller, N. C. Snaith. *The Lowest eigenvalue of Jacobi random matrix ensembles and Painlevé VI*. Journal of Physics A: Mathematical and Theoretical **43**:40 (2010) 405204 (27 pp).
7. E. Dueñez, D. W. Farmer, S. Froehlich, C. P. Hughes, F. Mezzadri, T. Phan. *Roots of the Derivative of the Riemann Zeta Function and of Characteristic Polynomials*. Nonlinearity **23** (2010) 2599–2621.
8. E. Dueñez, S. J. Miller. *The effect of convolving families of L -functions on the underlying group symmetries*. Proc. London Math. Soc. **99**:3 (2009) 787–820.
9. Stephanie Deacon, Eduardo Dueñez, José N. Iovino. *A public-key threshold cryptosystem based on residue rings*. J. Discrete Math. Sci. Cryptogr. **10**:4 (2007) 559–571.
10. E. Dueñez, S. J. Miller. *The low lying zeros of a $GL(4)$ and a $GL(6)$ family of L -functions*. Compos. Math. **142**:6 (2006) 1403–1425.
11. E. Dueñez. *“Harder” ensembles of orthogonal matrices*. Experiment. Math. **15**:3 (2006) 273–277.
12. E. Dueñez, S. J. Miller, A. Roy, H. Straubing. *Incomplete quadratic exponential sums in several variables*. J. Number Theory **116**:1 (2006) 168–199.
13. E. Dueñez. *Random matrix ensembles associated to compact symmetric spaces*. Comm. Math. Phys. **244**:1 (2004) 29–61.

PREPRINTS AND WORK IN PROGRESS

- E. Dueñez, J. Iovino, L. Salvetti Martinez, T. M. Wiederhold, Franklin Tall. *Complexity of deep computations via topology of function spaces* (In preparation.) arXiv:2601.00528.
- Samson Alva, E. Dueñez, J. N. Iovino, C. Walton. *Deep equilibria: Existence and computability* (To appear in Mathematical Structures in Computer Science.) arXiv:2409.06064.
- Peter G. Casazza, Eduardo Dueñez, José N. Iovino. *Nondefinability of the spaces of Tsirelson and Schlumprecht* (Accepted.)
- Eduardo Dueñez, José N. Iovino. *Analysis: The Study of Real-Valued and Random-Valued Structures* (Book in preparation.)

ACADEMIC SYNERGY AND MENTORSHIP

- Since 2006. Faculty mentor, UTSA Problem-Solving Club.
- Since 2006. UTSA Faculty Liaison to the Putnam Competition. (UTSA ranked top 8% nationwide in 2015.)
- 2012. Academic coach/mentor, AAAS Olympiad program. (Mentor/coach of 20 students from underrepresented communities in mathematics.)

THESES SUPERVISED

Master's Theses

- Zachery Sharon, UTSA (2011). *An Explicit Proof of the Weak Finite Basis Theorem and Applications to Computing Ranks of Elliptic Curves*
- Elkin O. Quintero Vanegas, Universidad Nacional de Colombia (2011). *La Fórmula del Número de Clases y Valores Especiales de Funciones-L: Desde Dirichlet y Dedekind hasta Stark*

Undergraduate Theses

- Julio C. Galindo López, UNAM (2013). *Matrices Aleatorias y Funciones-L*
- Dal S. Yu, UTSA (2011). *Representation Theory of Classical Compact Lie Groups*

PROFESSIONAL/EDITORIAL SERVICE AND DISTINCTIONS

- Associate Editor, Mathematics Magazine (2016 – 2019).
- Co-editor, Problems and Solutions column, Mathematics Magazine (2016 – 2019).
- Co-organizer (with J. Iovino), session “Topological Methods in Model Theory”, Meeting of the AMS Central Section, University of Texas at San Antonio (2024).
- Member, SACNAS Summer Leadership Institute (2015).
- Reviewer of manuscripts for Princeton University Press, Oxford University Press.
- Referee. Annals of Pure and Applied Logic, Bulletin of the London Mathematical Society, Communications in Mathematical Physics, Experimental Mathematics, Journal of Number Theory, Journal of Physics A, Mathematics Magazine, The Ramanujan Journal, Indian Journal of Mathematics, Random Matrices: Theory and Applications, and others.
- NSF panelist; proposal reviewer for CONACyT (Mexico).
- Judge of student abstracts and posters, SACNAS (2010 – 2018).

PROFESSIONAL MEMBERSHIPS

- American Mathematical Society (AMS)
- Mathematical Association of America (MAA)
- Association for Symbolic Logic (ASL)
- Society for Advancement of Chicanos and Native Americans in Science (SACNAS)

RESEARCH TALKS & SHORT COURSES

- Special Session on Ergodic Theory and Topological Dynamics (ISQGD-SS14), International Society for Quantization, Topology and Dynamics, March 2026. *Real-valued computations: a perspective via topology and model theory.*
- Fields Institute (Toronto), Dec 2023. *Integration of generalized functions in real-valued structures.*
- CMS Winter Meeting (Toronto), Dec 2023. *Structures of random variables and stability of Orlicz spaces.*
- Seminario FAMAT/DEMAT, Universidad de Guanajuato, Feb 2021. *Análisis y Lógica Continua.*
- Universidad de Colima, Sep 2018. *Convergencia metaestable y teoremas ergódicos desde la perspectiva de Lógica Continua.*
- Casa Matemática Oaxaca (Mexico), June 2018. *Convergencia metaestable y teoremas ergódicos desde la perspectiva de Lógica Continua.*
- AMS Sectional Meeting, University of Central Florida (Orlando, FL), September 2017. *Mean convergence of polynomial averages and continuous logic.*
- Mathematical Congress of the Americas. Montreal (Canada), July 2017. *Ergodic theorems and metastability.*
- Simposio Latinoamericano de Lógica y Modelos. Puebla (Mexico), June 2017. *Metastable convergence and ergodic theorems: a continuous logic viewpoint.*
- Joint Mathematics Meeting (Atlanta), January 2017. *Polynomial ergodic descent and uniformly metastable convergence.*
- Joint Mathematics Meeting (Atlanta), January 2017. *Uniformly metastable convergence in metric structures.*
- National Security Agency, Ft. Meade, MD, October 2016. *Metastable convergence of ergodic averages and continuous model theory.*
- SACNAS National Conference. Long Beach, CA, October 2016. *Random matrices and automorphic L-functions: Low-lying zeros and symmetry.*
- MAA Southeastern Section Conference, University of Alabama at Birmingham, March 2016. *The locus of median lines of Sierpinski's Triangle.*

- Georgia Tech, February 2016. *Convergence of ergodic averages and continuous model theory.*
- Joint Mathematics Meeting. San Antonio, January 2015. *The Mean Ergodic Theorem for Abelian Unitary Actions.*
- SACNAS national conference. Los Angeles, October 2014. *Families of polynomial mappings between groups.*
- University of Texas at Austin, March 2014. *Some arithmetic problems related to Sierpinski's Triangle.*
- Mathematical Congress of the Americas. Guanajuato, Mexico, August 2013. *A random matrix model for elliptic curve L-functions of finite conductor.*
- Purdue University, March 2013. *L-Functions and Random Matrices in Classical Compact Groups.*
- SACNAS National Conference, October 2012. *Random Matrices at the Intersection of Number Theory and Lie Groups.*
- Encuentro conjunto RSME-SMM. Malaga, Spain. January 2012. *Matrices aleatorias y ceros de funciones-L de twists cuadraticos de curvas elipticas.*
- Universidad Pedagogica y Tecnologica de Tunja, Colombia, November 2011. *Una invitacion a la teoria de representaciones.*
- Universidad Nacional de Colombia, July 2011. *Funciones Zeta y L: Aplicaciones clasicas y modernas en teoria de numeros.*
- University of Colima, Mexico, November 2010. *Funciones Zeta y L: Que son y para que sirven?*
- U. T. Austin, October 2010. *Zeros of L-functions and Random Matrices: Two Recent Applications.*
- XLI Congreso de la Sociedad Matematica Mexicana, October 2008. *La Zeta y las L's: Como se Metieron las Matrices Aleatorias a la Aritmetica?*
- X CNTA, Waterloo, July 2008. *Derivatives of Zeros of the Riemann Zeta-Function and of Characteristic Polynomials of Random matrices.*
- Texas AM University, April 2008. *Derivatives of Zeros of the Riemann Zeta-Function and of Characteristic Polynomials of Random matrices.*
- 22nd Annual Workshop on Automorphic Forms and Related Topics, March 2008. *Low-Lying Zeros of Modular (and Automorphic) L-functions.*
- XL Congress of the Mexican Mathematical Society, UANL, October 2007. *Condensacion de Zeros de Funciones-L de Curvas Elipticas.*
- The Banff International Research Station (BIRS), July 2007. *Finite-Conductor Models for Zeros of Elliptic Curves.*
- Number Theory Fest at the University of Illinois at Urbana-Champaign, May 2007. *Repulsion of Low Zeros in Families of Elliptic Curves.*
- Texas AM University, December 2006. *Convolution of Families of $GL(2)$ L-functions.*
- Instituto de Matemáticas, UNAM. Morelia (Mexico), August 2006. *What Dyson Wanted to Tell Schrodinger: Random Matrices in Number Theory.*
- IX CNTA, Vancouver, July 2006. *Examples and Conjectures on Convolutions of Families of L-functions.*
- Progress in Random Matrix Theory and Number Theory, University of Rochester, June 2006. *Twists and Functorial Liftings of Families of L-functions.*
- Joint Mathematics Meeting, San Antonio, January 2006. *Symmetry in Twisted Families of L-functions.*
- National Congress of the Mexican Mathematical Society, Mexico City, October 2005. *Riemann, Dyson and Schrodinger: Random Matrices in Number Theory.*
- The 2005 Conference on Automorphic Forms and Related Topics, University of North Texas, April 2005. *Counterexample to a Conjecture of Keating and Snaith.*
- The University of Texas at Austin, November 2004. *Symmetry Beyond Root Numbers.*
- The Pennsylvania State University, October 2004. *Symmetric Space Ensembles with an Application to Elliptic Curves.*
- University of Texas at San Antonio colloquium, September 2004. *Random Matrices: From Quantum Physics to Number Theory.*
- Isaac Newton Institute (U.K.), July 2004. *Symmetry Beyond Root Numbers: a $GL(6)$ example.*
- Isaac Newton Institute (U.K.), June 2004. *Symmetry Flipping in Families of L-functions.*
- Centre de Recherches Mathematiques (University of Montreal, Canada), May 2004. *Counterexample to a Conjecture of Keating and Snaith.*
- American Mathematical Society Eastern Meeting, Lawrenceville, NJ, May 2004. *The Symmetry Type of Two Families of L-functions.*
- Augusta State University, Augusta, GA, February 2004. *Statistical Properties of Energy Levels of Quantum Systems.*
- The Ohio State University, October 2003. *Random Matrices and Number Theory: A Happy Marriage?*
- The West Coast Number Theory Conference, Asilomar, December 2001. *Do the Cohen-Delaunay-Lenstra Heuristics apply to Quadratic Twists?*
- Stanford University, November 2001. *Random Matrix Ensembles associated to Compact Symmetric Spaces.*
- Centre de Recherches Mathematiques (University of Montreal, Canada), August 2001. *Random Matrix Ensembles associated to Compact Symmetric Spaces.*
- The Johns Hopkins University, February 2001. *Compact Symmetric Spaces and their associated Matrix Ensembles.*
- The American Institute of Mathematics, May 2001. *Breaking Universality in a Family of Circular Ensembles.*
- The Institute for Advanced Study, February 2001. *The Gaudin-Mehta Method and Classical Random Matrix Theory.*
- Mathematisches Forschungsinstitut Oberwolfach, Germany, November 2000. *Compact Symmetric Spaces and their associated Matrix Ensembles.*
- National Congress of the Mexican Mathematical Society, Morelia, Mexico, November 1994. *Div, Grad and Curl According to Lie.*

SURVEY AND OUTREACH TALKS & SHORT COURSES

- *From round-robin tournaments and networking events to combinatorial designs*. Morehouse College. Atlanta, GA, April 2018.
- *From round-robin tournaments and networking events to combinatorial designs*. Columbus State University, Columbus, GA, April 2016.
- *Introducción a la Teoría Clásica de Matrices Aleatorias*. 5-hour course at Centro de Investigación en Matemáticas, Merida, Mexico, April 2016.
- *Introducción a la Teoría Clásica de Matrices Aleatorias*. 5-hour course at Universidad Autónoma de Sinaloa, Mexico, October 2015.
- *El triángulo de Sierpinski, matrices modulares y aritmética*. SIDIM at Ponce, Puerto Rico. February 2014.
- *Signed Harmonic Series and Quadratic Number Fields*. Conference of the STMC (South Texas Mathematics Consortium). April 2013.
- *Matrices Aleatorias Gaussianas y Circulares*. 7-hour course at "Escuela de Matrices Aleatorias", CIMAT, Mexico, November 2012.
- *Minicurso de Matrices Aleatorias*. 7-hour course. "Metodos Estocasticos en Sistemas Dinamicos". CIMAT, Mexico, February 2009.
- *An Invitation to Diophantine Geometry*. XL Congress of the Mexican Mathematical Society, Monterrey, October 2007.
- *Random Matrices: A Meeting Point of Multiple Theories*. Trinity University, San Antonio, September 2005.
- *Three Lectures on Number Theory and Random Matrices*. The Ohio State University, August 2004.
- *Card Tricks, de Bruijn Sequences, and Hindu Music*. The McGraw Hill Center for Teaching and Learning (Princeton University), September 2000.
- *The Kinematic Method in Geometry*. UNAM, Mexico City, May 1994.

TEACHING EXPERIENCE

Asterisks "*" indicate cross-listed (UG/GR) or graduate (GR) courses.

Spring 2026 Mathematical Foundations of AI*	Spring 2017 Foundations of Mathematics
Fall 2025 (Industrial consulting leave)	Fall 2016 Foundations of Mathematics
Spring 2025 Foundations of Cryptography*	Fall 2016 Calculus I
Spring 2025 Modern Abstract Algebra	Spring 2016 (Research leave)
Fall 2024 Foundations of Analysis	Fall 2015 (Research leave)
Fall 2024 Modern Algebra	Spring 2015 Foundations of Cryptography*
Spring 2023 Foundations of Cryptography*	Spring 2015 Linear Algebra
Spring 2023 Abstract Algebra	Fall 2014 Foundations of Mathematics
Fall 2022 Foundations of Mathematics	Fall 2014 Calculus I
Fall 2022 Algebra I*	Fall 2014 Problem-Solving Seminar
Spring 2022 Foundations of Cryptography*	Spring 2014 Foundations of Analysis
Spring 2022 Algebra and Number Systems	Spring 2014 Differential Equations I
Fall 2021 Linear Algebra	Fall 2013 Calculus II
Fall 2021 Algebra and Number Systems	Fall 2013 Problem-Solving Seminar
Spring 2021 Foundations of Cryptography*	Spring 2013 Foundations of Analysis
Spring 2021 Algebra and Number Systems	Spring 2013 Complex Variables
Fall 2020 Foundations of Mathematics	Fall 2012 Calculus I
Fall 2020 Foundations of Analysis	Fall 2012 Multilinear Algebra
Spring 2020 Foundations of Cryptography*	Spring 2012 Modern Abstract Algebra
Fall 2019 Linear Algebra	Spring 2012 Calculus I
Fall 2019 Topics in Number Theory*	Fall 2011 Number Theory
Spring 2019 Foundations of Cryptography*	Fall 2011 Problem-Solving Seminar
Spring 2019 Linear Algebra	Spring 2011 Linear Algebra
Fall 2018 Linear Algebra	Spring 2011 Problem-Solving Seminar
Fall 2018 Calculus II	Fall 2010 Calculus II
Spring 2018 Abstract Algebra II	Fall 2010 Problem-Solving Seminar
Spring 2018 Foundations of Mathematics	Spring 2010 Calculus II
Fall 2017 Abstract Algebra I	Spring 2010 Problem-Solving Seminar
Fall 2017 Precalculus	Fall 2009 Number Theory
Spring 2017 Foundations of Cryptography*	Fall 2009 Problem-Solving Seminar

Spring 2009 Elliptic-Curve Cryptography*
Spring 2009 Problem-Solving Seminar
Fall 2008 Calculus III
Fall 2008 Linear Algebra
Fall 2008 Problem-Solving Seminar
Spring 2008 Calculus II
Spring 2008 Problem-Solving Seminar
Fall 2007 Problem-Solving Seminar
Fall 2007 Foundations of Mathematics
Spring 2007 Problem-Solving Seminar
Spring 2007 Foundations of Analysis
Spring 2007 Linear Algebra
Fall 2006 General Topology I*
Fall 2006 Calculus III

Spring 2006 Foundations of Analysis
Fall 2005 Complex Variables I*
Fall 2005 Freshman Seminar
Summer 2005 Calculus II
Spring 2005 Modern Abstract Algebra
Fall 2004 Modern Algebra
Spring 2004 Random Matrices with Applications
Spring 2004 Fourier Analysis
Fall 2003 Complex Analysis with Applications
Spring 2003 Calculus II for Biology and Medicine
Fall 2002 Calculus I for Biology and Medicine
Spring 2002 Linear Algebra
Fall 1999 Vector calculus