Robert Schneider
Lecturer / Undergraduate Research Program Coordinator
University of Georgia Department of Mathematics
Curriculum Vitae

Contact

Department of Mathematics
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Education

∘ Emory University, Atlanta, Georgia — Ph.D. in Mathematics (2018, advisor Ken Ono)
∘ Emory University, Atlanta, Georgia — M.S. in Mathematics (2016)
∘ University of Kentucky, Lexington, Kentucky — B.S. in Mathematics (2012)

Research interests

∘ Number theory and combinatorics; in particular, the theory of integer partitions, special functions in the orbit of modular forms (q-series, mock theta functions, quantum modular forms), and analytic number theory (zeta functions and other L-functions, arithmetic density, prime distribution).

∘ Secondary interests include algebra, discrete math, statistical physics, computational number theory, mathematical music theory, ethnomathematics, history of math, computational chemistry.

Employment

∘ University of Georgia, Lecturer (2018 – 2022)

∘ Emory University, Visiting Assistant Professor (Summer 2019, Summer 2018)

∘ Emory University, Dean's Teaching Fellow at Arrendale Women's Prison: History of Mathematics–Ancient Arithmetic and the Birth of Mathematics (Spring 2018), Writing Workshop (Fall 2017)

∘ Emory University, Graduate Student Instructor: Math 111–Calculus 1 (2013–2016)

∘ Emory University, Teaching Assistant: Calculus Help Session (2012–2013)

Other professional experience

∘ Musician, songwriter, record producer, composer for film/stage/television/installation, band-leader of The Apples in stereo (and member of other groups), co-founder of The Elephant 6 Recording Co. collective of musicians and artists, recording/mixing/mastering engineer, recording studio manager, record label manager, sound sculpture artist (1993 – , see Wikipedia entry for details)

Work with graduate students

∘ Agbolade Patrick Akande (Ph.D. Mathematics, current student), Directed project mentor resulting in two submitted papers with one other in preparation, 2020 - present

∘ Matthew Just (Ph.D. Mathematics, May 2021), Informal mentor and research collaborator resulting in two accepted publications with one other in preparation, 2019 - 2021

∘ Dru Horne (Ph.D. Mathematics Education, current student), Research project mentor associated to MATH 6670 - Combinatorics course, resulting in one paper in preparation, 2021 - present

∘ Zachary Peck (MS Artificial Intelligence, May 2021), Research mentor, thesis committee member

∘ Neelima Pulagam (MS Computer Science, May 2021), Research mentor resulting in one submitted paper, thesis committee member

Courses taught

∘ University of Georgia: MATH 1060 Mathematics of Decision Making, 1113 Precalculus, 2250 Calculus I, 4400/6400 Number Theory, 4670/6670 Combinatorics, 4760/6760 Mathematics and Music, 4850/6850 History of Mathematics, 5001/7001 Arithmetic and Problem Solving, 4950/4960R Undergraduate Research, 7000 Master's Research, 8800 Doctoral Directed Reading

∘ Emory University: Math 111 Calculus I, 112 Calculus II, 221 Linear Algebra - Recitation

Other teaching experience

∘ University of Georgia, Mathematics Undergraduate Research Program, Coordinator (2019 –)

∘ University of Georgia, Research mentor for over two dozen undergraduates including 6 research students with competitive funding from UGA's Center for Undergraduate Research Opportunities, and another student presenting at the Spring 2019 AMS Southeastern Sectional Meeting (2018 –)

∘ Peach State LSAMP (Louis Stokes Alliance for Minority Participation) Summer Bridge seminar (for incoming UGA freshman), Instructor: Intro to Calculus (Summer 2020, Summer 2021, Summer 2022)

∘ Emory QTM Math Circle (Math Camp for High School Students), Instructor: Number Theory II and History of Mathematics (Summer 2019)

∘ Decatur High School, Decatur, Georgia, Math Team coach volunteer (2016–2019)

∘ Glendover Elementary School, Lexington, Kentucky, Weekly math tutor volunteer (2006–2012)

Fellowships, awards, residencies and certifications

∘ Certificate in Diversity and Inclusion (completed five-course training sequence), University of Georgia Office of Institutional Diversity (2022)

∘ 2020 Athens Music Walk of Fame Inductee: The Elephant 6 Recording Co. (record label and art collective that I co-founded and managed), Athens Cultural Affairs Commission (2020)

∘ 2018 Marshall Hall, Jr., Graduate Teaching Award, Department of Mathematics and Computer Science, Emory University (2017-2018)

∘ Dean's Teaching Fellowship, Emory University (2017–2018)

∘ Residency, Banff International Research Station, Banff, Alberta, Canada, "*MSI: Music, Film and Mathematics Together*" (inter-disciplinary collaboration with number theorist Andrew Granville, screenwriter Jennifer Granville, musicians from Banff Centre) (Aug. 10–17, 2013)

∘ Woodruff Fellowship, Emory University (2012–2017)

Peer-reviewed research publications

1. A "strange" vector-valued quantum modular form (co-author Larry Rolen), *Archiv der Mathematik* **101.1** (2013): 43-52.

2. A golden product identity for *e*, *Mathematics Magazine* **87.2** (2014): 132-134.

3. Combinatorial applications of Moebius inversion (co-author Marie Jameson), *Proc. of the Am. Math. Soc.* **142.0** (2014): 2965-2971.

4. Partition zeta functions, *Research in Number Theory* **2.1** (2016): 9.

5. Arithmetic of partitions and the q-bracket operator, *Proc. of the Am. Math. Soc.* **145.5** (2017): 1953-1968.

6. Explorations in the theory of partition zeta functions (co-authors Ken Ono and Larry Rolen), *Exploring the Riemann Zeta Function, 190 years from Riemann's Birth*, editors: H. Montgomery, A. Nikeghbali, M. Rassias, Springer, Cham., 2017. 223-264.

7. Extracting aggregation free energies of mixed clusters from simulations of small systems: application to ionic surfactant micelles (co-authors Xiaokun Zhang, Lara Patel, Olivia Beckwith, Christopher Weeden, James Kindt), *Journal of Chemical Theory and Computation* **13.11** (2017): 5195-5206.

8. Partition-theoretic formulas for arithmetic densities (co-authors Ken Ono and Ian Wagner), *Analytic Number Theory, modular forms and q-hypergeometric series*, Springer Proc. Math. Stat **221** (2017): 611-624.

9. Jacobi's triple product, mock theta functions, unimodal sequences and the q-bracket, *International Journal of Number Theory* **14.07** (2018): 1961-1981.

10. Alternating "strange" functions, *Ramanujan Journal* **48.2** (2019): 245-250.

11. Sequentially congruent partitions and related bijections (co-author Maxwell Schneider), *Annals of Combinatorics* **23.3** (2019): 1027-1037.

12. The product of parts or "norm" of a partition (co-author Andrew V. Sills), *Integers* **20A**: Paper A13 (2020): 2-18.

13. Digit sums and generating functions (co-author Maxwell Schneider), *Ramanujan J.* **52(2)** (2020): 1-12.

14. Analysis and combinatorics of partition zeta functions (co-author Andrew V. Sills), *International Journal of Number Theory* **17.03** (2021): 805-814.

15. Sequentially congruent partitions and partitions into squares (co-authors James A. Sellers and Ian Wagner), *Ramanujan Journal* **56** (2021): 645-650.

16. Nuclear partitions and a formula for $p(n)$, *Journal of the Ramanujan Mathematical Society* **36:1** (2021): 33-37.

17. Partition Eisenstein series and semi-modular forms (co-author Matthew Just), *Research in Number Theory* **7.61** (2021).

18. Partition-theoretic formulas for arithmetic densities, II (co-authors Ken Ono and Ian Wagner), *Hardy-Ramanujan Journal* (2021).

19. A "supernormal" partition statistic (co-authors Madeline Locus Dawsey and Matthew Just), *Journal of Number Theory* (2022).

20. Combinatorial formulas for arithmetic density (co-author A. V. Sills), *INTEGERS* (2022).

21. Semi-modular forms from Fibonacci-Eisenstein series (co-author A. P. Akande), *Ramanujan Journal* (To appear).

Other publications
22. Uncovering Ramanujan's "lost" notebook: An oral history, *Ramanujan J.* **29.1-3** (2012): 3-24.

23. A non-Pythagorean musical scale based on logarithms, *Proceedings of Bridges: Mathematics, Music, Art, Architecture, Culture Conference* (2012).

24. A golden connection, *Mathematics Magazine* **87.2** (2014): 143.

25. Encounter with the infinite (co-author Benjamin Phelan), *The Believer* (January-February, 2015), reprinted in *Namarupa: Categories of Indian Thought* (2015).

26. Why Ramanujan Matters (co-author Ken Ono), *Sloan Science & Film* (May, 2016), reprinted in *Ramanujan Mathematical Society Newsletter* (March-June, 2016), reprinted in *Asia Pacific Mathematics News* (November, 2016).

27. Fibonacci numbers and the golden ratio, *Parabola* **52:3** (2016).

28. The music of *Prime Suspects* (article and musical score), *Prime Suspects: The Anatomy of Integers and Permutations*, authors: A. Granville, J. Granville, R. J. Lewis, Princeton University Press (2019).

29. Journal refereeing: Merge with the collective mind (co-author Ken Ono), *Notices of the American Mathematical Society* **67.2** (2020).

30. We're still untangling Ramanujan's mathematics 100 years after he died (co-author Ken Ono), *New Scientist* (22 April, 2020).

31. Infinite series for $\pi/3$ and other identities, *Parabola* (To appear).

Research papers submitted for publication

32. Computational study of non-unitary partitions (co-authors A. P. Akande, T. Genao, S. Haag, M. D. Hendon, N. Pulagam and A. V. Sills), Under revision.

33. Partition-theoretic Abelian theorems, Under revision.

34. Composition-theoretic series in partition theory (co-author A. V. Sills), Submitted for publication.

Invited talks and contributed paper talks

∘ Number Theory Colloquium, University of Virginia, Charlottesville, Virginia, invited lecture, "*Multiplicative theory of integer partitions*" (July 12, 2022)

∘ Number Theory Colloquium, University of Virginia, Charlottesville, Virginia, invited lecture, "*Making music with logarithms*" (June 14, 2022)

∘ Michigan Technological University, Houghton, Michigan, job talk, "*Multiplicative theory of integer partitions*" (Mar. 4, 2022)

∘ UGA Math Club, University of Georgia, Athens, Georgia, invited lecture, "*Making music with logarithms*" (Feb. 22, 2022)

∘ Specialty Seminar in Partition Theory, *q*-Series and Related Topics, Michigan Tech, Houghton, Michigan, invited lecture (online format), "*Semi-modular forms*" (joint work with A. P. Akande and M. Just – Dec. 2, 2021)

∘ Focus on Math Colloquium, Brigham Young University, Provo, Utah, invited lecture, "*Making music with logarithms*" (Nov. 4, 2021)

∘ Number Theory Seminar, Brigham Young University, Provo, Utah, invited lecture, "*Semi-modular forms*" (Nov. 4, 2021)

∘ Number Theory Seminar, University of Illinois Urbana-Champaign, Illinois, invited lecture (online format), "*Work in progress: a multiplicative theory of integer partitions*" (April 20, 2021)

∘ Specialty Seminar in Partition Theory, *q*-Series and Related Topics, Michigan Tech, Houghton, Michigan, invited lecture (online format), "*Under construction: a multiplicative theory of integer partitions*" (March 4, 2021)

∘ Nashville Math Club (high school group), Vanderbilt University, Nashville, Tennessee, invited workshop, "*Complex universe: Imaginary numbers and quaternions*" (Nov. 17, 2020)

∘ Number Theory Seminar, Vanderbilt University, Nashville, Tennessee, invited lecture (online format), "*Multiplicative theory of (additive) partitions*" (Oct. 27, 2020)

◦ Palmetto Joint Arithmetic, Modularity, and Analysis Series (PAJAMAS), Online conference, contributed talk, "*Analysis and combinatorics of partition zeta functions*" (joint work with A. V. Sills – Sept. 20, 2020)

◦ AMS/MAA Joint Mathematics Meetings (JMM), Denver, Colorado, AMS Special Session on Partition Theory and q-Series, invited lecture, "*Analysis and combinatorics of partition zeta functions*" (joint work with A. V. Sills – Jan. 18, 2020)

◦ Modular Forms, Arithmetic and Women in Mathematics (MAAIM) 2019, Emory University, Atlanta, Georgia, contributed talk, "*Sequentially congruent partitions and related bijections*" (joint work with Maxwell Schneider – Nov. 3, 2019)

◦ TATT 600: Emory Teaching Assistant Training and Teaching Opportunity (TATTO) Introductory Workshop 2019, Emory University, Atlanta, Georgia, invited lecture, "*You are the face of your subject*" (Aug. 20, 2019)

◦ Emory University, Atlanta, Georgia, Chalk Talk Physics Seminar, "*Partitions, statistical physics and the universe*" (June 27, 2019)

◦ Analytic and Combinatorial Number Theory: The Legacy of Ramanujan – A Conference in Honor of Bruce C. Berndt's 80th Birthday, University of Illinois, Urbana-Champaign, Illinois, contributed talk, "*Eulerian series and the algebra of partitions*" (June 8, 2019)

◦ AMS Spring Southeastern Sectional Meeting, University of Alabama, Auburn, Alabama, Special Session on Experimental Mathematics, invited lecture, "*Sequentially congruent partitions and related bijections*" (joint work with Maxwell Schneider – March 16, 2019)

◦ Palmetto Number Theory Series (PANTS) XXXI, University of South Carolina, Columbia, South Carolina, "*Multiplicative theory of (additive) partitions*" (Dec. 8, 2018)

◦ Integers Conference 2018, Augusta, Georgia, invited lecture, "*Multiplicative theory of (additive) partitions*" (Oct. 6, 2018)

◦ Focus on Math Colloquium, Brigham Young University, Provo, Utah, invited lecture, "*Music of the primes (literally)*" (Sept. 20, 2018)

◦ Number Theory Seminar, Brigham Young University, Provo, Utah, invited lecture, "*Multiplicative theory of (additive) partitions*" (Sept. 20, 2018)

◦ Combinatory Analysis 2018: A Conference in Honor of George Andrews' 80th Birthday, Pennsylvania State University, State College, Pennsylvania, contributed paper, "*Toward an algebra of partitions*" (June 23, 2018)

◦ AMS Western Sectional Meeting, Portland State University, Portland, Oregon, Special Session on Mock Modular and Quantum Modular Forms, invited lecture, "*Jacobi's triple product, mock theta functions, unimodal sequences and the q-bracket*" (April 14, 2018)

◦ University of Georgia, Athens, Georgia, job talk, "*Music of the primes (literally)*" (Feb. 27, 2018)

◦ AMS/MAA Joint Mathematics Meetings (JMM), San Diego, California, AMS Contributed Papers Session on Partitions, Paths and Permutations, "*Toward an algebra of partitions*" (Jan. 12, 2018)

◦ Number Theory Seminar, Georgia Southern University, Statesboro, Georgia, invited lecture, "*Partition zeta functions*" (Nov. 9, 2017)

◦ Computational Sciences Seminar, Georgia Southern University, Statesboro, Georgia, invited lecture, "*Number theory in statistical physics: using ipartitions to compute expected values*" (Nov. 8, 2017)

◦ Algebra Seminar, University of Tennessee, Knoxville, Tennessee, invited lecture, "*Partition zeta functions*" (May 2, 2017)

◦ AMS/MAA Joint Mathematics Meetings (JMM), Atlanta, Georgia, invited panel, "*MAA Panel: Outside the Equation – Exploring Alternative Forms of Mathematics Communication*" (Jan. 7, 2017)

∘ AMS/MAA Joint Mathematics Meetings (JMM), Atlanta, Georgia, invited talk, "*MAA Special Presentation: Relatively Prime – Live Podcast*" (Jan. 6, 2017)

∘ AMS/MAA Joint Mathematics Meetings (JMM), Atlanta, Georgia, AMS Contributed Papers Session on Number Theory, "*Jacobi's triple product, mock theta functions and the q-bracket*" (Jan. 4, 2017)

∘ Emory University, invited lectures to undergraduate Probability and Statistics class, "*Partitions, statistical physics and the universe*" (Nov. 29 - 30, 2016)

∘ International Conference on Number Theory in Honor of Krishna Alladi for His 60th Birthday, University of Florida, Gainesville, Florida, invited lecture, "*Arithmetic of partitions*" (Mar. 20, 2016)

∘ AMS Spring Southeast Sectional Meeting, University of Georgia, Athens, Georgia, Special Session on Experimental Mathematics, invited lecture, "*Arithmetic of partitions*" (Mar. 5, 2016)

∘ International Conference on Number Theory, SASTRA University, Kumbakonam, India, invited lecture, "*Partition zeta functions*" (Dec. 21, 2015)

∘ Combinatorics Seminar, Pennsylvania State University, State College, Pennsylvania, invited lecture, "*Partition zeta functions*" (Oct. 23, 2015)

∘ Maker Faire Atlanta 2015, Decatur, Georgia, electronics build demonstrations sponsored by Acorn Amplifiers, "*How to make a mind-controlled synthesizer*" (Oct. 3–4, 2015)

∘ Palmetto Number Theory Series (PANTS) XXIV, Emory University, Atlanta, Georgia, "*Partition-theoretic zeta functions*" (Sept. 12, 2015)

∘ TEDx Emory 2014 Conference, Emory University, Atlanta, Georgia, invited lecture, "[*Patterns etched in sound*](...)" (Apr. 12, 2014)

∘ The Legacy of Ramanujan, SASTRA University, Kumbakonam, India, invited lecture, "*A new 'strange' quantum modular form*" (joint work with Larry Rolen – Dec. 14, 2012)

∘ International Conference on the Works of Srinivasa Ramanujan and Related Topics, University of Mysore, Mysore, India, invited lecture, "*A new 'strange' quantum modular form*" (joint work with Larry Rolen – Dec. 12, 2012)

∘ Berry College, Floyd, Georgia, invited lecture, "*Proofs without lyrics: Mathematical ideas in musical form*" (Nov. 26, 2012)

∘ Kentucky Section MAA Annual Meeting, Bellarmine University, Louisville, Kentucky, Contributed Paper Session, "*Al-Jabar: A mathematical game of strategy*" (joint work with Cyrus Hettle – Mar. 31, 2012)

∘ Banff International Research Station for Mathematical Innovation and Discovery, Banff, Alberta, Canada, Mathematics: Muse, Maker, and Measure of the Arts Workshop, "*Proofs without lyrics: Mathematical ideas in musical form*" (Dec. 6, 2011)

∘ Spelman College, Atlanta, Georgia, invited lecture, "*Proofs without lyrics: Mathematical ideas in musical form*" (Sept. 22, 2011)

∘ University of Georgia, invited lecture to undergraduate Mathematics and Music class, "*Proofs without lyrics: Mathematical ideas in musical form*" (Sept. 21, 2011)

∘ Centre College, Danville, Kentucky, Bluegrass Undergraduate Mathematics Symposium, "*A golden pair of identities in the theory of numbers*" (Sept. 17, 2011)

∘ MAA MathFest, Lexington, Kentucky, Pure Mathematics Contributed Paper Session, "*A golden pair of identities in the theory of numbers*" (Aug. 6, 2011)

∘ Duke University, Durham, North Carolina, invited lecture to undergraduate neuroscience class, "*The Teletron mind-control interface for analog synthesizers*," with ensemble performance of experimental score "Eclipses of the Sun and Moon" composed by J. Mangum (Apr. 20, 2011)

◦ MAA MathFest, Portland, Oregon, Undergraduate Student Paper Session, "*On a fruitful identity in the theory of numbers*" (Aug. 7, 2009)

◦ Clemson University, Clemson, South Carolina, invited lecture to REU class, "*On a fruitful identity in the theory of numbers*" (June 6, 2009)

◦ MAA MathFest, San Jose, California, "*Public interview with Robert Schneider by MAA President Joe Gallian*" (Aug. 3, 2007)

Selected art projects and public works

◦ *Parabola* mathematics journal for secondary school students, "2ℤ *Or Not* 2ℤ*: An odd comic about even numbers*", ongoing comic series beginning Vol. 53, Issue 2 (Nov. 2017 – present); and "*Square root of negative pun*" (co-author Mike Chapman), ongoing comic series (Dec. 2018 – present)

◦ *Advice from the Oceans* art installation, Athens Institute of Contemporary Art (ATHICA), Athens, Georgia, "*Ocean Telephone No. 3*", "*Ocean Telephone No. 6*" and "*Synthesizer for the Wind*" (collaborations with Max Schneider), electronic sound sculptures (Sept. 13 – Nov. 16, 2014)

◦ Canadian Mathematical Society Meeting, Montreal, Quebec, Canada, musical score "*Reverie in Prime Time Signatures*" for play *MSI (Mathematical Sciences Investigation): The Anatomy of Integers and Permutations* by Andrew Granville, Jennifer Granville, electronic recording (Dec. 7 – 8, 2012)

◦ Gathering for Gardner – Celebration of Mind 2011, rules for original board game *Al-Jabar: A Mathematical Game of Strategy* based on abstract algebra (co-author Cyrus Hettle), published online to commemorate Martin Gardner's birthday (Oct. 21, 2011)

◦ AUX Experimental Arts Festival, Ciné Theater, Athens, Georgia, musical score "*Composition for Two Hemispheres*" for Teletron mind-controlled synthesizer, ensemble performance (May 7, 2011)

◦ Mathematical Sciences Research Institute (MSRI), Berkeley, California, musical score "*Reverie in Prime Time Signatures*" for play *MSI (Mathematical Sciences Investigation): The Anatomy of Integers and Permutations* by Andrew Granville and Jennifer Granville, electronic recording (Apr. 29, 2011)

◦ *The QR Code Show* art installation, Pink Hobo Gallery, Minneapolis, Minnesota, musical score "*Non-Pythagorean Composition No. 6*" based on logarithms, electronic recording (June 16 – Jul. 29, 2010)

◦ Institute for Advanced Study, Princeton, New Jersey, musical score "*Reverie in Prime Time Signatures*" for play *MSI (Mathematical Sciences Investigation): The Anatomy of Integers and Permutations* by Andrew Granville and Jennifer Granville, ensemble performance (Dec. 12, 2009)

Selected interviews and press about my art projects and public works

◦ Adam Clair, *Endless Endless: A Lo-Fi History of the Elephant 6 Mystery*, Hachette Books (2022).
◦ David Peisner, "True Harmony," *Atlanta Magazine*, Feb. 2018.
◦ Carol Clark, "New method calculates equilibrium constant at the small scale," *Phys.org*, 29 Jan. 2018.
◦ Joel Werner, "The Infinite God," *Sum of All Parts*, Australian Broadcasting System, 29 Sept. 2017.
◦ Caitie Kealy, "Apples in Stereo frontman Robert Schneider releases nerdy new math strategy game," *AVClub.com*, 17 July 2012.
◦ Scott Thill, "MindFlex Hack Turn Brain Waves Into Music," *Wired.com*, 21 Oct. 2010.
◦ Evie Nagy, "6 Questions with Robert Schneider," *Billboard*, Vol. 122 No. 14, 10 April 2010: 35.
◦ Mick Hamer, "Flexible Scales and Immutable Octaves," *New Scientist*, 23 Feb. 2008: 32 – 34.
◦ Michael Molenda, "Producer's Desk: Robert Schneider," *Guitar Player*, Vol. 36 No. 12, Dec. 2002: 30.

Referee experience

◦ Journals: *American Mathematical Monthly*, *Annals of Combinatorics*, *Bulletin des Sciences Mathématiques*, *Contributions to Discrete Mathematics*, *Electronic Journal of Combinatorics,*

Experimental Mathematics, Integers, Journal of Integer Sequences, Journal of Mathematical Analysis and Applications, Journal of the Ramanujan Mathematical Society, Mathematics Magazine, Minnesota Journal of Undergraduate Mathematics, *Ramanujan Journal, Research in Number Theory, Research in the Mathematical Sciences, Symmetry, Transactions on Combinatorics*
∘ Book publishers: CRC Press, Princeton University Press, Springer Books

Conference sponsorship

∘ AMS Special session in modular forms and combinatorics (co-organizer), Joint Mathematical Meetings (JMM) 2022, Seattle, Washington (April 9, 2022)
∘ UGA Summer Mathematics Undergraduate Research (SUMR) Conference (co-organizer), University of Georgia (Aug. 2020, Aug. 2021)

Memberships in professional organizations

∘ American Mathematical Society (AMS)
∘ American Society of Composers, Authors and Publishers (ASCAP)
∘ Mathematical Association of America (MAA)
∘ SIGMAA in Undergraduate Research
∘ SIGMAA in Recreational Mathematics (serving as 2022-2023 Chair)