

# Matthew C. Russell

<https://matthewcrussell.github.io/>

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## Education

Ph.D., Mathematics

Rutgers, the State University of New Jersey, Piscataway, New Jersey, May 2016  
Thesis: Using experimental mathematics to conjecture and prove theorems in  
the theory of partitions and commutative and non-commutative recurrences.  
Advisors: Vladimir Retakh and Doron Zeilberger.

M.S., Statistical Data Science  
Texas A&M University, December 2025

B.S., Mathematics-Interdisciplinary and Physics, summa cum laude  
Taylor University, Upland, Indiana, May 2010

## Positions held

**University of Illinois Urbana-Champaign**

Lecturer of mathematics

spring 2022 – spring 2024

**Rutgers, The State University of New Jersey**

Assistant teaching professor of mathematics fall 2018–fall 2021

Teaching instructor of mathematics fall 2016–spring 2018

Teaching assistant fall 2012–spring 2016

Torrey fellowship fall 2010–spring 2012

## Papers

Integer partitions and  $q$ -series:

- M. C. Russell, “On a pair of three-colored (mod 10) partition identities”, submitted. Preprint: [arXiv:2509.07169](https://arxiv.org/abs/2509.07169)
- S. Kanade, M. C. Russell, “Tight cylindric partitions”, submitted. Preprint: [arXiv:2508.15113](https://arxiv.org/abs/2508.15113)
- S. Kanade, M. C. Russell, S. Tsuchioka, S. O. Warnaar, “Remarks on the conjectures of Capparelli, Meurman, Primc and Primc”, submitted. Preprint: [arXiv:2404.03851](https://arxiv.org/abs/2404.03851)
- M. C. Russell, “A refinement of and a companion to MacMahon’s partition identity”, *Electronic Journal of Combinatorics* **32** (2025) no. 1, Paper 1.4, 10 pp.
- M. C. Russell, “Companions to the Andrews-Gordon and Andrews-Bressoud identities, and recent conjectures of Capparelli, Meurman, Primc, and Primc”, submitted. Preprint: [arXiv:2306.16251](https://arxiv.org/abs/2306.16251)
- K. Baker, S. Kanade, M. C. Russell, C. Sadowski, “Principal subspaces of basic modules for twisted affine Lie algebras,  $q$ -series multisums, and Nandi’s identities”, *Algebraic Combinatorics* **6** (2023), 1533–1556.
- S. Kanade, M. C. Russell, “Completing the  $A_2$  Andrews-Schilling-Warnaar identities”, *International Mathematics Research Notices* (2023), Issue 20, October 2023, Pages 17100–17155.

- S. Kanade, A. Milas, M. C. Russell, “On certain identities involving Nahm-type sums with double poles”, *Advances in Applied Mathematics* **143** (2023), paper No. 102452, 34 pp.
- S. Kanade, M. C. Russell, “On  $q$ -series for principal characters of standard  $A_2^{(2)}$ -modules”, *Advances in Mathematics* **400** (2022), paper no. 108282, 24 pp.
- T. Coelho, J. Kim, M. C. Russell, “A complete generalization of Göllnitz’s “big” theorem”. *Ramanujan Journal* **55** (2021), 73–102.
- S. Kanade, D. Nandi, M. C. Russell, “A variant of **IdentityFinder** and some new identities of Rogers-Ramanujan-MacMahon type”, *Annals of Combinatorics*, **23** (2019) no. 3–4, 807–834.
- S. Kanade, M. C. Russell, “Staircases to analytic sum-sides for many new integer partition identities of Rogers-Ramanujan type”, *Electronic Journal of Combinatorics* **26** (2019) no. 1, Paper 1.6, 33 pp.
- S. Kanade, K. Kurşungöz, M. C. Russell, “An open problem of Corteel, Lovejoy, and Mallet”. In: G. E. Andrews, F. Garvan (eds), Analytic Number Theory, Modular Forms and  $q$ -Hypergeometric Series. ALLADI60 2016. *Springer Proceedings in Mathematics & Statistics*, **221**, 343–370.
- S. Kanade, J. Lepowsky, M. C. Russell, A. V. Sills, “Ghost series and a motivated proof of the Andrews-Bressoud identities”, *Journal of Combinatorial Theory, Series A* **146** (2017), 33–62.
- B. Coulson, S. Kanade, J. Lepowsky, R. McRae, F. Qi, M. C. Russell and C. Sadowski, “A motivated proof of the Göllnitz-Gordon-Andrews identities”, *Ramanujan Journal* **42** (2017) no. 1, 97–129.
- S. Kanade, M. C. Russell, “**IdentityFinder** and some new identities of Rogers-Ramanujan type”, *Experimental Mathematics* **24** (2015) no. 4, 419–423.

Other mathematics:

- M. C. Russell, “Noncommutative recursions and the Laurent phenomenon”, *Advances in Applied Mathematics* **64** (2015), 21–30.
- R. J. Angeles-Canul, R. Norton, M. Opperman, C. Paribello, M. Russell, C. Tamon, “Perfect state transfer, integral circulants, and join of graphs”, *Quantum Information and Computation* **10** (2010), no. 3–4, 325–342.
- R. J. Angeles-Canul, R. Norton, M. Opperman, C. Paribello, M. Russell, C. Tamon, “On quantum perfect state transfer in weighted join graphs”, *International Journal of Quantum Information* **7** (2009), no. 8, 1429–1445.
- M. C. Russell, J. Fraser, S. Rizzo, M. H. Veatch, “Comparing LP bounds for queueing networks”, *IEEE Transactions on Automatic Control* **54** (2009), no. 11, 2703–2707.
- M. DeLong, M. C. Russell, J. Schrock, “Colorability and determinants of  $T(m, n, r, s)$  twisted torus knots for  $n \equiv \pm 1 \pmod{m}$ ”, *Involve* **8** (2015) no. 3, 361–384.

## Teaching experience

Physics and chemistry:

- P. P. Samuel Russell, A. K. Maytin, M. M. Rickard, M. C. Russell, T. V. Pogorelov, M. Gruebele, “The hinge-bending landscape of an enzyme in an atomistic cytoplasm simulation”, *Journal of Physical Chemistry Letters* **15** (2024), no. 4, 940–946.
- K. Kiers, T. Knighton, D. London, M. Russell, A. Szynkman, K. Webster, “Using  $t \rightarrow b\bar{b}c$  to search for new physics”, *Physical Review D* **84** (2011) no. 7, 074018.

## University of Illinois Urbana-Champaign

Course instructor:

- Calculus III: spring 2022, summer 2022, fall 2022, spring 2023, fall 2023, spring 2024

## Rutgers, The State University of New Jersey

Course instructor:

- Calculus I for the mathematical and physical sciences: fall 2019, fall 2020, fall 2021
- Calculus I for the life and social sciences: fall 2021
- Multivariable calculus: summer 2016, fall 2016, fall 2018, fall 2019, fall 2021
- Calculus II for the mathematical and physical sciences: spring 2020, fall 2020, spring 2021
- History of mathematics: spring 2020
- Graph theory: spring 2017, spring 2018, spring 2019
- Introduction to real analysis: fall 2017, fall 2018, spring 2019
- Introductory linear algebra: fall 2014, spring 2015, spring 2017, summer 2018, fall 2018
- Linear optimization: summer 2015, spring 2018
- Differential equations for engineering and physics: spring 2018
- Calculus II: fall 2017
- Introduction to probability: fall 2017
- Combinatorics: summer 2014, fall 2016
- Topics in mathematics for the liberal arts: spring 2014, fall 2016

Teaching assistant — recitation and review session instructor:

- Calculus II for the mathematical and physical sciences: spring 2016
- Linear optimization: fall 2015
- Multivariable calculus: fall 2013
- Calculus I: fall 2012, spring 2013

Other:

- Co-coordinator for mathematics TA training program: spring 2017, spring 2018, spring 2019
- Summer instructional supervisor for mathematics courses: summer 2016
- Head teaching assistant for Calculus II for the mathematical and physical sciences: spring 2016
- Head teaching assistant for summer mathematical courses: summer 2015
- Topics in Mathematics Education — Geometry and Measurement (instructional assistant for course conducted by New Jersey Partnership for Excellence in Middle School Mathematics): summer 2013
- New Brunswick Saturday Scholars Academy, mathematics instructor for SAT preparation: fall 2012–spring 2014

**Awards and honors**

- On University of Illinois Urbana-Champaign’s “List of Teachers Ranked as Excellent by Their Students”: spring 2022, summer 2022, fall 2022, spring 2023, fall 2023, spring 2024
- American Mathematical Society Rutgers Student Chapter Award for Faculty (voted on by graduate students): 2019
- Rutgers School of Arts and Sciences Award for Distinguished Contribution to Undergraduate Education: 2016
- Rutgers Department of Mathematics TA Teaching Excellence Award: spring 2014

**Service**

Selected journals refereed for:

- Advances in Mathematics
- Algebraic Combinatorics
- Annals of Combinatorics
- Journal of Combinatorial Theory, Series A

University of Illinois Urbana-Champaign:

- Member of Undergraduate Advising Committee, fall 2022–spring 2024

Rutgers, the State University of New Jersey:

- Member of Undergraduate Committee, spring 2020–fall 2021
- Chair of departmental subcommittee on Math 151 (Calculus I for the Mathematical and Physical Sciences), fall 2019–fall 2020
- Co-organized departmental Rutgers Day booth, April 2019
- Multivariable calculus guru/co-guru, fall 2018–spring 2019
- Garden State Undergraduate Mathematics Conference grader and judge, April 2019
- Co-organizer, Rutgers Experimental Mathematics Seminar, fall 2013–spring 2016

- Organizer, Rutgers Graduate Combinatorics Seminar, fall 2012–spring 2013
- Co-organizer, Rutgers Graduate Pizza Seminar, fall 2011–spring 2012

### **Undergraduate research**

- Spring 2019: advised three students in Math 496 (Research in Mathematics)
- Spring 2019: facilitated poster presentations of four students at the Garden State Undergraduate Mathematics Conference (one of whom won an award for one of the four best posters)
- Summer 2016: co-advised two students as part of the Rutgers Mathematics Department Research Experience for Undergraduates

### **Selected talks**

- September 2025. “Companions to the Andrews-Gordon and Andrews-Bressoud identities, and recent conjectures of Capparelli, Meurman, Primc, and Primc.” Specialty Seminar in Partition Theory,  $q$ -Series and Related Topics, Michigan Technological University.
- August 2025. “Bivariate generating functions for two-row tight cylindric partitions.” AMS Fall Western Sectional Meeting, Special Session on Recent Developments in Areas Influenced by Ramanujan’s Mathematics, University of Denver.
- April 2025. “A refinement of, and a companion to, MacMahon’s sequence-avoiding partition identity.” 2025 MAA Missouri Section Meeting, Saint Louis University.
- June 2024. “A refinement of, and a companion to, MacMahon’s partition identity.” The Legacy of Ramanujan 2024, Pennsylvania State University.
- March 2022. “Completing the  $A_2$  Andrews-Schilling-Warnaar identities.” Specialty Seminar in Partition Theory,  $q$ -Series and Related Topics, Michigan Technological University.
- June 2018. “Bijective proofs of some new MacMahon-style partition identities.” Combinatory Analysis 2018: Partitions,  $q$ -Series, and Applications, Pennsylvania State University.
- October 2017. “Fantastic identities, and where to find them.” University of Denver, Graduate Mathematics Colloquium.
- January 2017. “Companions and generalizations of Göllnitz’s “big” partition theorem.” Joint Mathematics Meetings, AMS Special Session on Arithmetic Properties of Sequences from Number Theory and Combinatorics.
- December 2015. “Experimental mathematics and partition identities.” Ursinus College Mathematics Möbius Talk.
- August 2015. “**IdentityFinder** and some new identities of Rogers-Ramanujan type.” Conference on Lie Algebras, Vertex Operator Algebras, and Related Topics, University of Notre Dame.

- March 2015. “Automated exploration of Somos-like sequences, noncommutative recursions, and the Laurent phenomenon.” AMS Spring Eastern Sectional Meeting, Special Session on Somos Sequences and Nonlinear Recurrences, Georgetown University.
- October 2014. “Conjecturing new partition identities with computer algebra.” AMS Fall Eastern Sectional Meeting, Special Session on Experimental Mathematics in Number Theory, Analysis, and Combinatorics, Dalhousie University.
- March 2014. “Experimental mathematics and Somos sequences.” Taylor University Mathematics Colloquium.
- 2011–2020. Various talks, Rutgers, The State University of New Jersey (Graduate Combinatorics Seminar, Graduate Pizza Seminar, Experimental Mathematics Seminar, Basic Notions and Research Perspectives Seminar, Rutgers Undergraduate Mathematics Association talk).