

AARON ROBERTSON  
PROFESSOR OF MATHEMATICS

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#### EDUCATION

- Ph.D., Mathematics, Temple University, Philadelphia, May 1999.  
Thesis advisor: Doron Zeilberger.  
Thesis title: *Some New Results in Ramsey Theory*.
- B.S., Mathematics, University of Michigan, Ann Arbor, May 1993.  
Graduated *with highest distinction* (top 3% of graduating class).  
Elected to Phi Beta Kappa.

#### EMPLOYMENT

- July 1999 - June 2005    Assistant Professor of Mathematics, Colgate University
- July 2005 - June 2012    Associate Professor of Mathematics, Colgate University
- July 2012 - present        Professor of Mathematics, Colgate University

#### RESEARCH INTERESTS

- Combinatorics: Ramsey theory, enumerative combinatorics.

#### PUBLICATIONS

- (1) Review of Social Security Financing and Related Matters  
(Coauthors: Cecil J. Nesbitt (lead author) and Felicity Messner)  
Actuarial Research Clearing House **1993.1** (1993), 249-282.
- (2) A 2-Coloring of  $[1, N]$  Can Have  $N^2/22 + O(N)$  Monochromatic Schur Triples, But Not Less!  
(Coauthor: Doron Zeilberger)  
Electronic Journal of Combinatorics **5** (1998), R19, 4pp.
- (3) New Lower Bounds for Some Multicolored Ramsey Numbers  
Electronic Journal of Combinatorics **6** (1999), R3, 6pp.
- (4) Permutations Containing and Avoiding 123 and 132 Patterns  
Discrete Mathematics and Theoretical Computer Science **3** (1999), 119-122.
- (5) Permutation Patterns and Continued Fractions  
(Coauthors: Herbert S. Wilf, Doron Zeilberger)  
Electronic Journal of Combinatorics **6** (1999), R38, 6pp.

- (6) Difference Ramsey Numbers and Issai Numbers  
Advances in Applied Mathematics **25** (2000), 153–162.
- (7) Off-diagonal Generalized Schur Numbers  
(Coauthor: Daniel Schaal)  
Advances in Applied Mathematics **26** (2001), 252–257.
- (8) Permutations Restricted by Two Distinct Patterns of Length Three  
Advances in Applied Mathematics **27** (2001), 548–561.
- (9) New Lower Bound Formulas for Some Multicolored Ramsey Numbers  
Electronic Journal of Combinatorics **9** (2002), R13, 6pp.
- (10) On Generalized Van der Waerden Triples  
(Coauthor: Bruce Landman)  
Discrete Mathematics **256** (2002), 279–290.
- (11) Refined Restricted Permutations Avoiding Subsets of Patterns of Length Three  
(Coauthor: Toufik Mansour)  
Annals of Combinatorics **6** (2002), 407–418.
- (12) Refined Restricted Permutations  
(Coauthors: Dan Saracino and Doron Zeilberger)  
Annals of Combinatorics **6** (2002), 427–444.
- (13) *Ramsey Theory on the Integers*  
(Coauthor: Bruce Landman)  
American Mathematical Society, STML **24**, 2004, xvi + 317 pages.
- (14) Restricted Permutations from Catalan to Fine and Back  
Séminaire Lotharingien de Combinatoire **50** (2004), B50g, 13pp.
- (15) Some New Exact van der Waerden Numbers  
(Coauthors: Bruce Landman and Clay Culver ([undergraduate student](#)))  
Integers **5(2)** (2005), 11pp.
- (16) On the Degree of Regularity of Generalized van der Waerden Triples  
(Coauthors: Nikos Frantzikinakis and Bruce Landman)  
Advances in Applied Mathematics **37** (2006), 124–128.
- (17) Refined Restricted Involutions  
(Coauthors: Emeric Deutsch and Dan Saracino)  
European Journal of Combinatorics **28** (2007), 481–498.
- (18) On Monochromatic Ascending Waves  
(Coauthor: Tim LeSaulnier ([undergraduate student](#)))  
in *Combinatorial Number Theory*, Proceedings in Mathematics Series, deGruyter, 2007, 13pp.
- (19) Two Color Off-diagonal Rado-type Numbers  
(Coauthor: Kellen Myers ([undergraduate student](#)))  
Electronic Journal of Combinatorics **14** (2007), #R53, 10pp.
- (20) A Method for Quantifying Rotation Symmetry  
(Coauthors: Frank Frey and Michael Bukoski ([undergraduate student](#)))  
New Phytologist **175** (2007), 785–791.
- (21) Avoiding Monochromatic Sequences with Special Gaps  
(Coauthor: Bruce Landman)  
SIAM Journal of Discrete Math **21** (2007), 794–801.

- (22) On the Asymptotic Minimum Number of Monochromatic 3-Term Arithmetic Progressions  
(Coauthors: Pablo Parrilo and Dan Saracino)  
Journal of Combinatorial Theory Series A **115** (2008), 185-192.
- (23) Some Two Color, Four Variable Rado Numbers  
(Coauthor: Kellen Myers ([undergraduate student](#)))  
Advances in Applied Math **41** (2008), 214-226.
- (24) Bounds on Some van der Waerden Numbers  
(Coauthors: Tom Brown and Bruce Landman)  
Journal of Combinatorial Theory Series A **115** (2008), 1304-1309.
- (25) *Combinatorial Number Theory*  
(Coeditors: B. Landman, M. Nathanson, J. Nešetřil, R. Nowakowski, and C. Pomerance)  
de Gruyter, 2009, viii + 204 pages.
- (26) Multiplicity of Monochromatic Solutions to  $X + Y < Z$   
(Coauthors: Wojciech Kosek, Dusty Sabo, and Daniel Schaal)  
Journal of Combinatorial Theory Series A **117(8)** (2010), 1127-1135.
- (27) Van der Waerden's Theorem and Avoidability in Words  
(Coauthors: Yu-Hin Au and Jeffrey Shallit)  
Integers **11** (2011), 15pp.
- (28) *Combinatorial Number Theory: Proceedings of Integers Conference 2011*  
(Coeditors: B. Landman, M. Nathanson, J. Nešetřil, R. Nowakowski, and C. Pomerance)  
de Gruyter, 2013, ix + 157 pages.
- (29) *Ramsey Theory on the Integers, Second Edition*  
(Coauthor: Bruce Landman)  
American Mathematical Society, STML **73**, 2014, xx + 384 pages.
- (30) A Probabilistic Threshold for Monochromatic Arithmetic Progressions  
Journal of Combinatorial Theory Series A **137** (2016), 79-87.
- (31) Intermingled Ascending Wave  $m$ -Sets  
(Coauthors: Caitlin Cremin, Will Daniel, and Quer Xiang (all [undergraduate students](#)))  
Discrete Mathematics **339** (2016), 560-563.
- (32) The Determination of 2-color Zero-sum Generalized Schur Numbers  
(Coauthors: Bidisha Roy and Subha Sarkar)  
Integers **18** (2018), #A96.
- (33) Zero-sum Generalized Schur Numbers  
Journal of Combinatorics and Number Theory **10** (2018), 51-62.
- (34) Zero-sum Analogues of Van Der Waerden's Theorem on Arithmetic Progressions  
Journal of Combinatorics **11**, 231-248.
- (35) Down the Large Rabbit Hole  
Rocky Mountain Journal of Mathematics **50** (2020), 237-253.
- (36) On the Distribution of Monochromatic Complete Subgraphs and Arithmetic Progressions  
(Coauthors: Will Cipolli and Maria Dascalu ([undergraduate student](#)))  
to appear in Experimental Mathematics.

MATH MAJOR THESES DIRECTED

1. Schur's Theorem Over Finite Fields  
Caroline Wardlow, 2016.
2. Algorithmic Solution to Rado's Columns Condition  
Dylan Giustra, 2016.
3. Some New Difference Ramsey Numbers  
Jiayang Li, 2016.
4. A Classification of Exponents that Form Triangles  
Dan Pucci, 2016.
5. On the Non-Uniqueness of Entropy  
Skylar Weber, 2016.
6. Looking at Discrete Derivatives for Monomials  
Ames Tardio, 2016.
7. Survival Free-fall in Newtonian Mechanics  
Alice Mi, 2017.
8. An Investigation of the Abundancy Index  
Adam Buys, 2017.
9. Finding a Class of  $4 \times 4$  Matrices on Which the Rule of Sarrus Can Be Applied  
Jordan Chervin, 2017.
10. Elliptic Curve Cryptography  
Robert Galante, 2017.
11. Arithmetic Derivative on Complex Numbers  
Michael Heins, 2017.
12. Analysis of the Puck Puzzle  
Kil Hyun Kim, 2017.
13. Van der Waerden's Theorem on Sequences with Interchanging Gap Sizes  
Daoyang Shan, 2017.
14. Change-Making Problems in the World of Even Value  
Limin Tang, 2017.
15. Computerized Proofs of Hypergeometric Identities  
Nicole Brower, 2019.
16. Exploring Equi-Colored Arithmetic Progressions on Equi-Colored Two-Colorings  
Jackson French, 2019.
17. A Non-trivial Lower Bound for a van der Waerden-like Function  
Lumbardh Halitjaha, 2019.
18. Investigating Feynman's Integration Technique  
San Kyung Lee, 2019.
19. Determining Knight-distance Between Squares on an  $n \times n$  Chessboard  
Ruchit Shrestha, 2019. *High Honors*
20. Discrete Dynamical System Modeling to Solve a Card Trick  
Maddie Srivastava, 2019.

21. Fast Inverse Square Root Algorithm  
Serena Sutaria, 2019.
22. Lattice Points on the Surface of  $n$ -spheres for Small  $n$   
Ruiyun Tang, 2019.
23. Monte Carlo and Quasi-Monte Carlo Integration  
Saiyang Zhang, 2019.
24. The Non-uniqueness of Entropy of Probability Distributions  
Ethan Ackerman, 2019.
25. Eigenvalues of a Path, Its Complement, and the Associated Adjacency Matrices  
Julia Blackwell, 2019.
26. Using Contour Integration for Infinite Sums  
Kelly Goodwin, 2019.
27. Solving the Generalization of a Putnam Problem  
Hannah Bailey, 2019.
28. Finding Derivatives Without the Use of Limits  
Katherine Ellsworth, 2019.
29. Using Markov Chains to Imitate Authors' Styles  
Kayla Logar, 2019. *High Honors*
30. Constructing Derivative Rules for Positive Integers  
Malachi Jones, 2019.
31. Quick Algorithm for Finding Point Location  
Phillip Matos, 2019. *High Honors*
32. Exploring a Set of Matrices  
Brooke Perisho, 2019.
33. Finding Solutions to Initial Conditions of a  $5 \times 5$  Gameboard With Tiles Linked by Adjacency  
Tyler Nelson, 2019.

#### INVITED TALKS

- (September, 1998) *Schur Triples and Difference Ramsey Numbers*, Combinatorics Seminar, University of Pennsylvania.
- (September, 1998) *Difference Ramsey Numbers*, EPADEL Section of the MAA, Lehigh University.
- (January, 1999) *Using Recurrence Relations in Ramsey Theory* (20 minute invited speaker), Special Session on Discrete Models and Difference Equations, Joint Mathematics Meeting, San Antonio, TX.
- (April, 1999) *Difference Ramsey Numbers and Issai Numbers*, Departmental Colloquium, William Patterson University.
- (November, 1999) *Generalized Van der Waerden Triples* (30 minute invited speaker), Third UNCG Conference in Combinatorics and Graph Theory, University of North Carolina at Greensboro.
- (November, 1999) *Avoiding Patterns*, Science Colloquium, Colgate University.
- (November, 2000) *Pattern Avoiding and Containing Permutations* (30 minute invited speaker), Fourth UNCG Conference in Combinatorics and Graph Theory, University of North Carolina at Greensboro.
- (March, 2003) *Permutations from Catalan to Fine and Back* (30 minute invited speaker), Séminaire Lotharingien de Combinatoire, Ottrott, France.

- (October, 2003) *Permutations from Catalan to Fine and Back* (30 minute invited speaker), Integers Conference 2003, State University of West Georgia.
- (February, 2004) *Ramsey Theory for the Masses*, Science Colloquium, Colgate University.
- (April, 2007) *An Off-diagonal Version of a Theorem of Rado* (50 minute invited speaker), Experimental Math Seminar, Rutgers University.
- (October, 2007) *Van der Waerden Numbers and Related Functions* (20 minute invited speaker), Integers Conference 2007, University of West Georgia.
- (February, 2008) *The State of Ramsey Theory* (50 minute special colloquium), Lafayette College.
- (October, 2009) *On Monochromatic Solutions to  $X + Y < Z$*  (20 minute invited speaker), Integers Conference 2009, University of West Georgia.
- (May, 2010) *Trudging Through the 2-Large Conjecture* (20 minute invited speaker), Recent Progress in Classical Combinatorics: A Conference, Rutgers University.
- (October, 2011) *A New Lower Bound for Certain Off-Diagonal Van der Waerden Numbers* (20 minute invited speaker), Integers Conference 2011, University of West Georgia.
- (March, 2012) *On the 2-Large Conjecture* (50 minute invited speaker), Simon Frasier Combinatorics Seminar.
- (October, 2016) *Ramsey and Delaporte* (20 minute invited speaker), Integers Conference 2016, University of West Georgia.
- (March, 2017) *Yes, It's a Math Talk*, Science Colloquium, Colgate University.
- (April, 2017) *Probability and Ramsey Theory* (50 minute invited speaker), Rutgers Experimental Math Seminar.
- (January, 2018) *On the Distribution of Ramsey Objects* (20 minute invited speaker), Joint Mathematics Meeting, San Diego
- (July, 2021) *TBD*, Combinatorics and Algebra, Weizmann Institute of Science, Rehovot, Israel

#### PROFESSIONAL ACTIVITIES

- Department Chair, Colgate University, July 2014 to June 2017. Major accomplishments include: stewarding an Applied Math major proposal to fruition through a department with vastly disparate ideas; handling one successful tenure case and two successful third-year review cases; obtaining two incremental positions for the department while Colgate had a university-wide non-expansion agenda; completed a curriculum overhaul through thoughtful sequencing of courses and the addition of many new, and unique to Colgate, courses. Implemented a thesis requirement for all majors.
- Associate Managing Editor of Integers (<http://www.integers-ejcnt.org>), since 1999. Since 1999, have been responsible for the publication of over 1000 articles; coordinated with deGruyter publishing while the journal appeared both online and in print.
- Co-chair with Doron Zeilberger and co-organizer with George Andrews, Richard Askey, Herb Wilf, and Doron Zeilberger of Classical Combinatorics: An International Conference (July 2000).
- Co-chair with George Andrews, Victor Moll, Jim Propp, Herb Wilf, and Melkamu Zeleke of Recent Progress in Classical Combinatorics: A Conference (May 2010).
- Guest editor for the FoataFest proceedings, appearing as a special issue of Advances in Applied Mathematics for which I was coauthor, with Joseph Kung and Doron Zeilberger, of an introduction/biographical sketch of Foata.

- Referee for: *Advances in Applied Mathematics*, *American Math. Monthly*, *Ars Combinatorica*, *Australasian Journal of Combinatorics*, *Computers and Mathematics with Applications*, *Discrete Mathematics*, *Discrete Mathematics and Theoretical Computer Science*, *Electronic Journal of Combinatorics*, *Experimental Math*, *Graphs and Combinatorics*, *Integers*, *International Journal of Mathematics and Mathematical Sciences*, *Journal of Combinatorial Theory Series A*, *Journal of Combinatorics and Number Theory*, *Journal of Difference Equations and Applications*, *Rocky Mountain Journal of Mathematics*, and *Séminaire Lotharingien de Combinatoire*.
- Reviewer for *Mathematical Reviews* (mathscinet)
- Reviewer of NSF, NSA, Natural Sciences and Engineering Research Council of Canada, and Australian Science Foundation grant applications.
- Referee for a chapter in Kitaev's book *Patterns in Permutations and Words* published by Springer.
- Referee for Bóna's graduate-level book *Combinatorics of Permutations* published by Chapman-Hall/CRC Press.
- Reviewer for 6th edition of Mann's *Introductory Statistics* published by Wiley.

#### GRANTS

- NSA research grant for Theoretical and Computational Ramsey Theory, 2010-2012, #H98230-10-1-0204, \$30,000 to cover summer salary.
- NSF conference grant for Recent Progress in Classical Combinatorics: A Conference, #DMS-1001793, \$21,700.
- NSF conference grant for Classical Combinatorics: An International Conference, co-pi with Doron Zeilberger, #DMS-9985949, \$10,000 with matching \$10,000 from Temple University.

#### AWARDS

- Three-time nominee for Colgate University's Phi Eta Sigma professor of the year
- Colgate research council Associate Leave awardee
- \$50 prize from Doron Zeilberger for "almost" solving one of Ron Graham's prize problems.
- Shared \$100 prize from Ron Graham for co-solving one of his prize problems.

#### COURSES TAUGHT

Typically teach 5 courses per year from the following list:

- Combinatorial Problem Solving,
- Introduction to Probability,
- Introduction to Statistics (for non-majors),
- Number Theory and Mathematical Reasoning,
- Ramsey Theory on the Integers,
- Real Analysis I,
- Research Seminar (the department's capstone course).

#### DEPARTMENTAL SERVICE

- Departmental chair (3 years), Actuarial advisor (14 years), renovation of departmental space committee, assessment coordinator (5 years), created and implemented the department's capstone course

#### INSTITUTIONAL SERVICE

- Treasurer for Phi Beta Kappa (6 years)
- Goldwater scholarship review board (5 years)
- Student Activities Board (4.5 years, ongoing)
- *Chair* of Committee on Information Technology (3 years)
- Budget and Finance Committee (3.5 years)
- Benefits Committee (3 years)
- Faculty liaison for Women's Ice Hockey (9 years, ongoing)
- Fulbright award review board (3 years)
- Watson fellowship review board (3 years)
- Science Colloquium organizer (2 years)
- Affirmative Action report statistical consultant (2 years)
- Alcohol and Drug Advisory Committee (1.5 years)
- Emergency Response Plan Committee (1 year)
- SET form analysis Committee (1 year)
- Research Council (1 semester)
- Picker Grant Committee (1 semester)