

Eric S. Egge

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Education

- **Ph. D.** in Mathematics, University of Wisconsin, Madison, WI, May, 2000
Minor: Computer Science
Research Area: Algebraic and Enumerative Combinatorics (MR #05A,#05E)
Advisor: Paul M. Terwilliger
- **M. A.** in Mathematics, University of Wisconsin, Madison, WI, December, 1995
- **B. A.** in Mathematics, *summa cum laude*, Carleton College, Northfield, MN, June, 1994

Positions Held

- **Associate Professor of Mathematics**, Carleton College, Fall, 2009–Present
- **Visiting Scholar**, University of Pennsylvania, Fall, 2008
- **Assistant Professor of Mathematics**, Carleton College, Fall, 2005–Spring, 2009
- **Assistant Professor of Mathematics**, Gettysburg College, Fall, 2000–Spring, 2005

Honors and Awards

- **Carleton College Towsley Student Research Grant**, March, 2011
- **Carleton College HHMI Student Research Grant**, March, 2009
- **Carleton College Hewlett Mellon and Elledge Fellowship**, November, 2007
- **Carleton College HHMI Student Research Grant**, March, 2007
- **Carleton College HHMI Curriculum Development Grant**, with Sam Patterson, February, 2007
- **Gettysburg College Research and Professional Development Grant**, December, 2003
- **Gettysburg College Research and Professional Development Grant**, with Darla Kremer, December, 2002
- **Johnson Center for Creative Teaching Fellowship**, with Steven J. Gimbel, 2002
- **Gettysburg College Research and Professional Development Grant**, May, 2002
- **Gettysburg College Research and Professional Development Grant**, December, 2001
- **Project NExT Fellow (Gold Dot)**, 2000-01
- **University of Wisconsin Graduate School Excellence in Teaching Award**, 2000
- **University of Wisconsin Vilas Travel Grant**, 2000
- **University of Wisconsin College of Letters and Science Teaching Fellow**, 1999
- **GAANN Research Fellowship**, 1997, 1998, 1999

- **University of Wisconsin Department of Mathematics Excellence in Teaching Award**, 1998
- **Phi Beta Kappa**, Carleton College Chapter, 1994
- **National Forensic Association Nationals in Impromptu Speaking**, 1992, 1993

Courses Taught

- **Lower Level**

FOCUS Colloquium, Mathematical Ideas, Calculus with Precalculus I, Calculus with Precalculus II, Calculus with Problem Solving, Calculus I, Calculus II, Mathematical Modeling

- **Intermediate Level**

Multivariable Calculus, Inquisitive Problem Solving, Linear Algebra, Introduction to Mathematical Structures

- **Upper Level**

Differential Equations, Abstract Mathematics II, Introduction to Combinatorics, Complex Analysis, Numerical Analysis, From Zero to Infinity: Philosophical Revolutions in Mathematics (with Steven J. Gimbel), Abstract Algebra, From the Shape of the Nile to the Shape of Space: Philosophical Revolutions in the History of Geometry (with Steven J. Gimbel), Topics in Graph Theory, Topics in Combinatorics: The Alternating Sign Matrix Conjectures, Advanced Topics in Combinatorics

- **Masters Level**

Combinatorial Analysis and Graph Theory

- **Independent Studies**

Advanced Abstract Algebra, Advanced Graph Theory, Chaotic Dynamical Systems, Combinatorial Optimization, Commutative Algebra and Zero-Divisor Graphs, Finite Simple Groups, Mathematical Writing, Probability and Statistics

Undergraduate Research Supervised

1. Tracale Austin, Hans Bantilan, Isao Jonas, and Paul Kory, *The Pfaffian Transform*, Mathematics capstone project, Fall 2006 to Winter 2007.

The Pfaffian Transform, *Journal of Integer Sequences*, vol. 12, Article 09.1.5, 2009.

2. David Lonoff and Jonah Ostroff, *Restricted Symmetric Permutations*, supported by a Carleton grant from the Howard Hughes Medical Institute, Summer 2007.

Symmetric Permutations Avoiding Two Patterns, *Annals of Combinatorics*, vol. 14, pp. 143–158, 2010.

3. Adrian Duane, *Kepler Towers, Kepler Walls, and Narayana Statistics*, Spring 2007 to Spring 2008.

4. Nathan Williams, *Alternating Sign Matrices*, Spring 2008.

An Alternating Sum of Alternating Sign Matrices, *Rose-Hulman Undergraduate Mathematics Journal*, vol. 9, issue 2, 2008.

5. Alex Fisher, *Identities for Triangular Recurrences*, supported by a Carleton grant from the Howard Hughes Medical Institute, Summer 2009.

6. Long Chan and Erin Jones, *Functions on Young's Lattice*, supported by a Carleton grant from the Howard Hughes Medical Institute, Summer 2009.

Functions on Young's Lattice, *Pi Mu Epsilon Journal*, accepted.

7. Erica Chesley, Zack Starer-Stor, and Emma Zhou, *A Puzzle for the Higman-Sims Group*, Winter and Spring 2010.
8. Xin Chen, *A $q = -1$ Phenomenon in Pattern-Avoiding Permutations*, supported by Carleton's Kolenkow-Reitz Research Fund, December 2010.

A $q = -1$ Phenomenon in Pattern-Avoiding Permutations, *Rose-Hulman Undergraduate Mathematics Journal*, vol. 12, issue 2, 2011.
9. Ben Anderson, Xin Chen, Andy Hardt, Tommy McCauley, Tung Phan, and Justin Troyka, *Variations on Loehr and Warrington's Infinite Family of Partition Bijections*, Winter and Spring 2011.
10. Gabe Davis, Aaron Maurer, and Julie Michelman, *Search for a Bijective Proof of a Macdonald Polynomial Symmetry*, Winter and Spring 2011.
11. Andy Hardt and Justin Troyka, *Enumerating Restricted Symmetric Signed Permutations*, partially supported by Carleton's Towsley endowment, Summer 2011.

Restricted Symmetric Signed Permutations, *Pure Mathematics and Applications*, Permutation Patterns 2011 Proceedings, submitted.

Research Publications

- [1] A Generalization of the Terwilliger Algebra, *Journal of Algebra*, vol. 233, pp. 213–252, 2000.
- [2] The Generalized Terwilliger Algebra and its Finite Dimensional Modules when $d = 2$, *Journal of Algebra*, vol. 250, pp. 178–216, 2002.
- [3] A Weight-Preserving Bijection between Schröder Paths and Schröder Permutations, with Jason Bandlow and Kendra Killpatrick, *Annals of Combinatorics*, vol. 6, pp. 235–248, 2002.
- [4] Permutations Which Avoid 1243 and 2143, Continued Fractions, and Chebyshev Polynomials, with Toufik Mansour, *Electronic Journal of Combinatorics*, vol. 9(2), article #R7, 2003.
- [5] A Schröder Generalization of Haglund's Statistic on Catalan Paths, with James Haglund, Kendra Killpatrick, and Darla Kremer, *Electronic Journal of Combinatorics*, vol. 10, article #R16, 2003.
- [6] 132-Avoiding Two-stack Sortable Permutations, Fibonacci Numbers, and Pell Numbers, with Toufik Mansour, *Discrete Applied Mathematics*, vol. 143, issue 1–3, pp. 72–83, 2004.
- [7] Restricted 3412-Avoiding Involutions, Continued Fractions, and Chebyshev Polynomials, *Advances in Applied Mathematics*, vol. 33, issue 3, pp. 451–475, 2004.
- [8] 231-Avoiding Involutions and Fibonacci Numbers, with Toufik Mansour, *Australasian Journal of Combinatorics*, vol. 30, pp. 75–84, 2004.
- [9] Restricted Permutations, Fibonacci Numbers, and k -Generalized Fibonacci Numbers, with Toufik Mansour, *Integers: The Electronic Journal of Combinatorial Number Theory*, vol. 5, article A1, 2005.
- [10] Bivariate Generating Functions for Involutions Restricted by 3412, with Toufik Mansour, *Advances in Applied Mathematics*, vol. 36, pp. 118–137, 2006.
- [11] Restricted Signed Permutations Counted by the Schröder Numbers, *Discrete Mathematics*, vol. 306, pp. 552–563, 2006.
- [12] Restricted Colored Permutations and Chebyshev Polynomials, *Discrete Mathematics*, vol. 307, pp. 1792–1800, 2007.
- [13] Restricted Symmetric Permutations, *Annals of Combinatorics*, vol. 11, pp. 405–434, 2007.

- [14] The Pfaffian Transform, with Tracale Austin, Hans Bantilan, Isao Jonas, and Paul Kory, *Journal of Integer Sequences*, vol. 12, Article 09.1.5, 2009.
- [15] Enumerating rc -Invariant Permutations with No Long Decreasing Subsequences, *Annals of Combinatorics*, vol. 14, pp. 85–101, 2010.
- [16] Legendre-Stirling Permutations, *European Journal of Combinatorics*, vol. 31, pp. 1735–1750, 2010.
- [17] From Quasisymmetric Expansions to Schur Expansions via a Modified Inverse Kostka Matrix, with Nicholas A. Loehr and Gregory S. Warrington, *European Journal of Combinatorics*, vol. 31, pp. 2014–2027, 2010.
- [18] The Jacobi-Stirling Numbers, with George E. Andrews, Wolfgang Gawronski, and Lance L. Littlejohn, in preparation.

Other Publications

- [19] How a Math Class Can be Two Places at Once: A Proposed Mathematical/Philosophical Collaboration, with Steven J. Gimbel, *Proceedings of the Fifth Annual International Conference of Bridges: Mathematical Connections in Art, Music, and Science*, 2002.

Conference Talks

1. A Generalization of the Terwilliger Algebra, Invited Lecture, AMS Special Session on Algebraic Combinatorics: Association Schemes, DePaul University, Chicago, IL, September 13, 1998.
2. The Generalized Terwilliger Algebra of Certain Strongly Regular Graphs, Contributed Talk, Geometric and Algebraic Combinatorics Conference in honor of J. J. Seidel on his 80th birthday, Oisterwijk, The Netherlands, August 18, 1999.
3. A Generalization of the Terwilliger Algebra of a Commutative Association Scheme, Contributed Talk, DIMACS Workshop on Codes and Association Schemes, DIMACS Center, Rutgers University, Piscataway, NJ, November 11, 1999.
4. Modules for the Generalized Terwilliger Algebra in the Diameter Two Case, Contributed Talk, AMS Session on Associative Rings and Algebras, Joint Mathematics Meetings, Washington, DC, January 22, 2000.
5. The Generalized Terwilliger Algebra of a Strongly-Regular Graph, Invited Lecture, Com²Mac Conference on Association Schemes, Codes and Designs, Pohang, Korea, July 4, 2000.
6. Modules for the Generalized Terwilliger Algebra in the Diameter Two Case, Contributed Talk, Algebraic Combinatorics, Monster and Vertex Operator Algebras Conference, University of California, Santa Cruz, CA, July 27, 2000.
7. Restricted Permutations Related to Fibonacci Numbers and k -Generalized Fibonacci Numbers, Contributed Talk, AMS Special Session on Algebraic Combinatorics, Joint Mathematics Meetings, San Diego, CA, January 9, 2002.
8. Restricted Permutations, Fibonacci Numbers, and k -Generalized Fibonacci Numbers, Contributed Talk, Tenth International Conference on Fibonacci Numbers and Their Applications, Flagstaff, AZ, June 25, 2002.
9. Permutations Which Avoid 1243 and 2143, Continued Fractions, and Chebyshev Polynomials, Invited Lecture, AMS Special Session on Algebraic and Enumerative Combinatorics, University of Central Florida, Orlando, FL, November 10, 2002.

10. The Generalized Terwilliger Algebra of a Finite Group, Invited Lecture, AMS Special Session on Character Theory of Finite Groups and Algebraic Combinatorics, SUNY-Binghamton, Vestal, NY, October 11, 2003.
11. Connections Between Diagonal Harmonics and Schröder Paths, Invited Lecture, Minisymposium on Macdonald Polynomials and the Combinatorics of the Space of Diagonal Harmonics, SIAM Conference on Discrete Mathematics, Nashville, TN, June 13, 2004.
12. 3412-Avoiding Involutions, Continued Fractions, and Chebyshev Polynomials, Contributed Talk, Second Annual International Conference on Permutation Patterns, Malaspina University-College, Nanaimo, British Columbia, July 5, 2004.
13. Signed Permutations Counted by the Schröder Numbers, Workshop on Permutation Patterns, University of Haifa, Haifa, Israel, May 30, 2005.
14. Restricted Symmetric Permutations, Joint Mathematics Meetings, AMS Session on Combinatorics, New Orleans, LA, January 8, 2007.
15. The Binomial and Hankel Transforms of a Sequence, Spring Meeting of the North Central Section of the MAA, St. Paul, MN, April 14, 2007.
16. Restricted Symmetric Permutations, Contributed Talk, Fifth Annual International Conference on Permutation Patterns, St. Andrews University, St. Andrews, Scotland, June 15, 2007.
17. The Tableaux Graph of a Permutation, Joint Mathematics Meetings, AMS Session on Combinatorics, San Diego, CA, January 9, 2008.
18. Permutations Invariant Under rc and Avoiding 4321, Seventh Annual International Conference on Permutation Patterns, University of Firenze, Florence, Italy, July 13, 2009.
19. Legendre-Stirling Permutations, Contributed Talk, AMS Special Session on Enumerative Combinatorics, Florida Atlantic University, Boca Raton, FL, October 31, 2009.
20. Symmetric Permutations with No Long Decreasing Subsequences, Joint Mathematics Meetings, AMS Session on Discrete Mathematics, San Francisco, CA, January 15, 2010.

Poster Presentations

1. A Generalization of the Terwilliger Algebra, Poster Presentation, Formal Power Series and Algebraic Combinatorics 10th Annual Conference, Fields Institute, Toronto, Ontario, June 15, 1998.
2. Modules for the Generalized Terwilliger Algebra, Poster Presentation, MAA - Project NExT - YMN Poster Session, Joint Mathematics Meetings, Washington, D.C., January 20, 2000.

Selected Lectures

- How Math Makes (Some) Marriages Stable, Colloquium Talk, Gettysburg College, Gettysburg, PA, November 6, 2008.
- The Alternating Sign Matrix Conjectures, Colloquium Talk, Swarthmore College, Swarthmore, PA, September 23, 2008.
- Restricted Symmetric Permutations, Combinatorics Seminar Talk, University of Pennsylvania, Philadelphia, PA, September 16, 2008.
- The Catalan Numbers and Kepler Towers, Research Seminar Talk, St. Olaf College, Northfield, MN, May 2, 2008.

- The Alternating Sign Matrix Conjectures, Colloquium Talk, St. Olaf College, Northfield, MN, November 14, 2006.
- Wilf-Equivalence in Pattern-avoiding Permutations and Involutions, Research Seminar Talk, St. Olaf College, Northfield, MN, April 21, 2006.
- An Introduction to Pattern-avoiding Permutations and Involutions, Visiting Lecture, Macalester College, St. Paul, MN, April 21, 2006.
- The Alternating Sign Matrix Conjectures, Colloquium Talk, Carleton College, Northfield, MN, February 17, 2005.
- The Alternating Sign Matrix Conjectures, Student Seminar Talk, Bucknell University, Lewisburg, PA, October 28, 2004.
- The Alternating Sign Matrix Conjectures, Colloquium Talk, Gettysburg College, Gettysburg, PA, September 23, 2004.
- Mathematical Teflon: How Mathematics Made Music Scratch Resistant, Pi Mu Epsilon Induction Talk, Hood College, Frederick, MD, April 18, 2004.
- 3412-Avoiding Involutions, Continued Fractions, Chebyshev Polynomials, and Enumerations, Combinatorics Seminar Talk, University of Pennsylvania, Philadelphia, PA, November 11, 2003.
- Permutations Which Avoid 1243 and 2143, Continued Fractions, and Chebyshev Polynomials, Combinatorics Seminar Talk, Howard University, Washington, DC, June 25, 2003.
- The Alternating Sign Matrix Conjectures, Colloquium Talk, St. Olaf College, Northfield, MN, February 11, 2003.
- The Alternating Sign Matrix Conjectures, Colloquium Talk, Beloit College, Beloit, WI, February 4, 2003.
- The Alternating Sign Matrix Conjectures, Colloquium Talk, Swarthmore College, Swarthmore, PA, October 1, 2002.
- The Mathematics of the Compact Disc, Central Pennsylvania Mathematics Association Annual Conference, Shippensburg University, Shippensburg, PA, April 4, 2002.
- The Alternating Sign Matrix Conjectures, Math Club Talk, St. Mary's College, MD, October 11, 2001.
- The Mathematics of the Compact Disc, Division of Natural Sciences and Mathematics Colloquium Talk, St. Mary's College, MD, October 10, 2001.
- The Mathematics of the Compact Disc, Colloquium Talk, Gettysburg College, Gettysburg, PA, September 6, 2001.
- Restricted Permutations, Sorting, and a Remarkable Continued Fraction, Combinatorics Seminar Talk, Colorado State University, April 6, 2001.
- The Terwilliger Algebra of a Commutative Association Scheme and a Generalization, Combinatorics Seminar Talk, The George Washington University, February 23, 2001.
- Voting Paradoxes, Arrow's Theorem, and the Case of the Math Department Mascot, Colloquium Talk, Shippensburg University, February 20, 2001.
- Voting Paradoxes, Arrow's Theorem, and the Case of the Math Department Mascot, Division of Natural Sciences and Mathematics Colloquium Talk, St. Mary's College, MD, November 15, 2000.
- Voting Paradoxes, Arrow's Theorem, and the Case of the Math Department Mascot, Colloquium Talk, Gettysburg College, Gettysburg, PA, September 7, 2000.

- Modules for the Generalized Terwilliger Algebra of a Strongly Regular Graph, Seminar Talk, National Security Agency, Fort Meade, MD, March 16, 2000.
- The Alternating Sign Matrix Conjectures, Colloquium Talk, Gettysburg College, Gettysburg, PA, March 7, 2000.
- Modules for the Generalized Terwilliger Algebra of a Strongly Regular Graph, Combinatorics Seminar Talk, University of Wisconsin, Madison, WI, February 7, 2000.
- Catalan-like Numbers and Determinants of Hankel Matrices, Combinatorics Seminar Talk, University of Wisconsin, Madison, WI, October 4, 1999.
- Transfer Matrices and the Partition Function, Combinatorics Seminar Talk, University of Wisconsin, Madison, WI, February 8, 1999.
- The Tutte Polynomial and the Partition Function, Combinatorics Seminar Talk, University of Wisconsin, Madison, WI, November 23, 1998.
- The T-Algebra and the Primary Module, Combinatorics Seminar Talk, University of Wisconsin, Madison, WI, February 23, 1998.
- Alternating Sign Matrices, Combinatorics Seminar Talk, University of Wisconsin, Madison, WI, November 10, 1997.
- The Local Structure of the Johnson Graph, Combinatorics Seminar Talk, University of Wisconsin, Madison, WI, October, 1996.

Department Service

- **Problem Solving Group Co-Coordinator**, Carleton College, Fall, 2005–Present
- **Website Coordinator**, Carleton College, Fall, 2006–Spring, 2008
- **Website Coordinator**, Gettysburg College, 2003–05
- **Problems of the Month Coordinator**, Gettysburg College, 2000–05
- **Putnam Exam Coordinator**, Gettysburg College, 2003-04
- **Moravian Conference Coordinator**, Gettysburg College, 2001-02
- **MAA Student Chapter Advisor**, Gettysburg College, 2000-01
- **Colloquium Co-Coordinator**, Gettysburg College, 2000-01
- **Sidewalk Math Co-Coordinator**, University of Wisconsin-Madison, 1997–2000

Professional Service

- **Referee** for *Ars Combinatoria*, *Annals of Combinatorics*, *College Mathematics Journal*, *Communications in Algebra*, *Discrete Applied Mathematics*, *Discrete Mathematics*, *Electronic Journal of Combinatorics*, *European Journal of Combinatorics*, *INTEGERS*, *Journal of Integer Sequences*, *Journal of Combinatorial Theory, Series A*, *Journal of Combinatorial Theory, Series B*, *Journal of Statistical Inference and Planning*, *Mathematics Magazine*, *Proceedings of the American Mathematical Society*, and *Proceedings of the International Conference of Renaissance Banff*
- **NSF Grant Review Panelist**, at least once between 2008 and 2011
- **MAA EPaDel Section Undergraduate Presentation Coordinator**, 2002–05

- **AP Calculus Reader**, 2002–Present
- **Reviewer for Math Reviews**, 2001–Present
- **Johnson Center for Creative Teaching Advisory Board Member**, Spring, 2005
- **Unleash Your Mathematical Magnetism: All About Attracting Math Majors, Project NExT Panel Organizer**, with Donna L. Flint (South Dakota State University), July, 2001
- **Writing Letters of Recommendation, Project NExT Panel Organizer**, with Emily Hynds (Samford University), January, 2001