

Christopher R. H. Hanusa

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RESEARCH INTERESTS

Enumerative Combinatorics, Combinatorial Structures, Integer Sequences, Theory of Determinants, Graph Theory, Mathematical Models, Computer Algorithms, Social Science Applications.

TEACHING INTERESTS

Particular courses of interest: Graph Theory, Advanced Combinatorics, Mathematical Modeling, Optimization, Discrete Mathematics, Putnam and Mathematical Contest in Modeling Preparation. Also enthusiastic about teaching any undergraduate course.

EMPLOYMENT

Assistant Professor, QUEENS COLLEGE, CUNY, Flushing, NY, 2008 – present.

Robert Riley Assistant Professor, BINGHAMTON UNIVERSITY, SUNY, Binghamton, NY, 2005 – 2008.

EDUCATION

UNIVERSITY OF WASHINGTON, Seattle, WA, 2003 – 2005.

Ph.D. in Mathematics, June 2005

Dissertation: A Gessel-Viennot-Type Method for Cycle Systems and Applications to Aztec Pillows

Advisor: Henry Cohn

UNIVERSITY OF WASHINGTON, Seattle, WA, 2001 – 2003.

M.S. in Mathematics, June 2003

HARVEY MUDD COLLEGE, Claremont, CA, 1997 – 2001.

B.S. in Mathematics, May 2001

Thesis: A Generalized Binet's Formula for k th Order Linear Recurrences: A Markov Chain Approach

Advisor: Francis Su

HONORS AND AWARDS

VIGRE Fellowship, UW Department of Mathematics, 2005.

Excellence in Teaching Award, UW Department of Mathematics, 2003 – 2004.

Graduate School Merit Award, University of Washington, 2001.

Teaching Assistantship, UW Department of Mathematics, 2001 – 2005.

NSF Fellowship Honorable Mention, 2001.

MCM Competition - Outstanding, Spring 2001; Honorable Mention, Spring 2000.

Freshman Mathematics Award, Harvey Mudd College, 1998.

RESEARCH EXPERIENCE

Research with James Propp (University of Massachusetts Lowell) by e-mail correspondence, July 2007.
Freize patterns, Laurent polynomials, integer relations.

Research with Xavier Viennot, Laboratoire Bordelais de Recherche en Informatique, Bordeaux, France, June 2006.

Dyck paths, heaps and pieces, orthogonal polynomials.

Research with Robin Pemantle, University of Pennsylvania, Philadelphia, PA, August 2005.
Urn problems, multivariate generating functions.

Ph.D. Research with Henry Cohn, University of Washington, Seattle, WA, September 2003 – June 2005.
Aztec pillows, domino tilings, cycle covers, matrix theory.

Collaboration, Center For Research on Health Care, Pittsburgh, PA, November 2003 – March 2004.
The theory behind existing and newly-created utility assessments.

Directed reading with R. Tyrrell Rockafellar, University of Washington, Seattle, WA, January 2003 – August 2003.

Convex optimization and transportation optimization. The traffic assignment problem.

Undergraduate Research, Harvey Mudd College Mathematics Department, Claremont, CA, August 2000 – May 2001.

Fibonacci generalizations and Markov chain methods.

Undergraduate Research, Center for Environmental Studies, Harvey Mudd College, Claremont, CA August 2000 – May 2001.

Member of a group of six students to research, analyze, and problem solve the specific goals set by our sponsor with respect to the landscaping of the Harvey Mudd Campus.

TEACHING EXPERIENCE AND TRAINING

Instructor, Mathematical Modeling, Spring 2007.

Creation of course (first time taught on campus), Maple tutorial creation and instruction, guidance of term-long student projects and presentations, in addition to responsibilities in my courses below.

Instructor, Graph Theory, Spring 2006 and Spring 2008, and Combinatorics, Fall 2007.

Full responsibility for course, including choice of text and course structure, lecturing, exam creation and grading, leading group discussions, problem set creation and grading, and holding office hours.

Instructor, Calculus I, Fall 2005, Spring 2006, Fall 2006, and Fall 2007.

Responsibilities include choice of course structure, syllabus design, lecturing, problem set creation, coordinating with TA, leading student problem discussion, web site creation, and holding office hours.

Lecturer, Matrix Algebra, September 2004 – December 2004.

Responsibilities include choice of course structure, syllabus design, lecturing, problem set creation, coordinating with the homework grader, web site creation, and holding office hours.

Quiz Section Leader, Calculus, September 2001 – December 2003. (4 quarters)

Responsibilities include leading recitation, holding office hours, and grading quizzes and exams.

Teaching Assistant, Math. Modeling and Graduate Linear Optimization, April 2002 – March 2004.

Responsibilities include holding weekly office hours, grading homeworks and projects, Matlab tutoring.

PUBLICATIONS

- Hanusa, Christopher R. H. and Patrick Madden, A Sink-Free Orientation Algorithm. In preparation.
- Chaiken, Seth, Christopher R. H. Hanusa, and Thomas Zaslavsky, Nonattacking queens in a rectangular strip. Submitted, 2007.
- Hanusa, Christopher R. H. Ensuring every candidate wins under positional voting. Accepted for publication in *Social Choice and Welfare*, 2008.
- Hanusa, Christopher R. H. Applying a combinatorial determinant to count weighted cycle systems in a directed graph. In press in *Discrete Mathematics*, 2008. doi:10.1016/j.disc.2008.02.020
- Hanusa, Christopher R. H. Pseudo-centrosymmetric matrices, with applications to counting perfect matchings. *Linear Algebra Appl.*, Vol 427 (2-3), pp. 206–217, 2007.
- Hanusa, Christopher R. H. A Gessel–Viennot-type method for cycle systems in a directed graph. *Electron. J. Combin.*, 13 (2006), Research Paper 37, 28 pp. (electronic).
- Benjamin, A. T., Christopher R. H. Hanusa, and Francis E. Su. Linear Recurrences Through Tilings and Markov Chains. *Utilitas Mathematica*, Vol 64, pp. 3–17, November 2003.
- Hanusa, Christopher R. H., Ari Nieh, and Matthew Schnaider. Jammin’ with Floyd: A Traffic Flow Analysis of South Carolina Hurricane Evacuation. *UMAP Journal* Vol 22 (3) 2001. [Published as an Outstanding Mathematical Contest in Modeling article.]

POSTERS

- Formal Power Series and Algebraic Combinatorics, June 2005.
A Gessel–Viennot-Type Method for Cycle Systems.
- International Biometric Society - ENAR, Pittsburgh, PA, March 2004.
Sample Size Determination in Studies Where Health State Utility Assessments Are Compared Across Groups and Time. [Joint with Barbara H. Hanusa.]

TALKS

- Let’s Count: Enumeration through matrix methods*
Queens College, February 2008.
Temple University Colloquium, March 2006.
- Voting Methods and Colluding Voters*
Gettysburg College, January 2008.
Binghamton University, December 2007.
- Five days of five speakers in (roughly) fifty minutes*
Binghamton University, March 2007.
- A Gessel–Viennot-Type Method for Cycle Systems*
Gettysburg College, January 2008.
Laboratoire Bordelais de Recherche en Informatique (given in French), June 2006.
Cornell University, November 2005.
Binghamton University, September 2005.
Carnegie Mellon University, March 2005.
University of Washington, February 2005.
University of California, Berkeley, February 2005.

Matrix Types and Operations Arising in Matching Theory

Binghamton University, September 2005.

University of Washington, April 2005.

An Introduction to Tilings

University of Washington, February 2005.

A Binet's Form for Generalized Fibonacci Numbers through Random Tilings and Markov Chains

University of Washington, May 2002.

Fibonacci Generalizations

Harvey Mudd College, April 2001.

CONFERENCES

Joint Mathematics Meetings. San Diego, CA. January 6–9, 2008.

Discrete Mathematics Day at Middlebury College. Middlebury, VT. September 15, 2007.

Statistical Mechanics and Combinatorics School. Val-Morin, Québec. February 12–16, 2007.

Discrete Mathematics Day at Binghamton University. Binghamton, NY. May 6, 2006.

Formal Power Series and Algebraic Combinatorics. Taormina, Italy. June 20–25, 2005.

MSRI workshop on Markov Chains in Algorithms and Statistical Physics. Berkeley, CA.

January 31–February 4, 2005.

Joint Mathematics Meetings. Atlanta, GA. January 5–8, 2005.

Formal Power Series and Algebraic Combinatorics. Vancouver, BC, Canada. June 28–July 2, 2004.

Mt. Baldy Mathematics Conference. Claremont, CA. October 28, 2000.

RELATED ACTIVITIES

Binghamton University learning community faculty contact, Binghamton, NY. Fall 2006, Fall 2007.

A supported-learning group for incoming freshman. Discussions on teaching, learning, and mentoring, holding office hours in the dorm, organizing workshops on succeeding in math classes.

Faculty contact for Graduate TA Orientation, Binghamton University, August 21, 2007.

Institute for Student-Centered Learning Conference, Binghamton University, May 21–22, 2007.

Faculty co-sponsor of the undergraduate math club, 2005 – present.

Co-organizer of Discrete Mathematics Day at Binghamton University, May 6, 2006.

The regional discrete math conference.

Co-organizer of the Binghamton University combinatorics seminar, 2005 – present.

Co-organizer of the University of Washington combinatorics and geometry seminar, 2004 – 2005.

Organizer of the combinatorics pre-seminar for undergraduates, 2005.

Introduction to ideas presented in the combinatorics seminar for research-motivated undergraduates.

Math Olympiad Program Co-Leader, TOPS at Seward Public School, Seattle. Nov. 2003 – May 2004.

After-school program for fourth and fifth graders. Preparing questions, administering the Olympiad, preparing directed homework questions.

Referee for *Annals of Combinatorics*, *Ars Combinatoria*, *Canadian Applied Mathematics Quarterly*,

Discrete Applied Mathematics, *Electronic Journal of Combinatorics*, *Journal of Algebraic*

Combinatorics, *SIAM Journal on Discrete Mathematics*.

LANGUAGES

Fluent in English and French.

PERSONAL

Hiking and enjoying the great outdoors, international travel, intramural sports, squash, badminton, ultimate frisbee, mosaics, mathematical and logic puzzles.

REFERENCES

Laura Anderson, Binghamton University, laura.AT.math.binghamton.edu

Sara Billey, University of Washington, billey.AT.math.washington.edu.

Henry Cohn, Microsoft Research, cohn.AT.microsoft.com.

Steve Duarte, Binghamton University, sduarte.AT.binghamton.edu.

Tom Zaslavsky, Binghamton University, zaslav.AT.math.binghamton.edu