

Vita of Lynne M. Butler

Department of Mathematics and Statistics
Haverford College
Haverford, PA 19041

Hilles 212
lbutler@haverford.edu
Home: (609) 818-9540

Education	M.S. in Statistics, The University of Chicago	2013
	Ph.D. in Mathematics, Massachusetts Institute of Technology	1986
	B.A. in Mathematics, The University of Chicago	1981
Academic Professional Experience	Professor of Mathematics, Haverford College	1996–
	Research Professor, Mathematical Sciences Research Institute	1996–1997
	Associate Professor of Mathematics, Haverford College	1991–1996
	Assistant Professor of Mathematics, Princeton University	1988–1993
	Postdoctoral Fellow, Institute for Mathematics and Its Applications	1987–1988
Instructor in Mathematics, Princeton University	1986–1987	
Previous Grant Support	National Science Foundation, Division of Mathematical Sciences, Research at Undergraduate Institutions, with project director Greene. Grant DMS-9500962. Award: \$156,790. Title: Algebraic and Enumerative Combinatorics. Duration: 3 years, June 1, 1995 – May 31, 1998.	
	National Science Foundation, Division of Human Resource Development, Visiting Professorships for Women. 1996–97 sabbatical support. Grant HRD-9627172. Title: Topological Insights in Combinatorics.	
	National Science Foundation, Division of Undergraduate Education, Course and Curriculum Development, with co-principal investigators Ball, Butler and Kuhn. Grant DUE-9455972. Award: \$25,000 (including \$15,285 for Haverford). Title: Mathematics Concentrations in Economics and Chemistry. Duration: $2\frac{1}{2}$ years, November 15, 1994 – April 30, 1997.	
	National Security Agency, Mathematical Sciences Program. Grant MDA90-H-4029. Title: The Algebraic Combinatorics of Hall-Littlewood Symmetric Functions. Duration: $3\frac{1}{2}$ years, May 30, 1990 – December 31, 1993. Amount: \$50,906.	
Industrial Research	Cryptology, IDA Center for Communications Research, Princeton. Summer 1998.	
	Cryptology, IDA Center for Communications Research, La Jolla. Summer 1994.	
	Cryptology, IDA Center for Communications Research, Princeton. Summers 1989, 1990.	
	Speech recognition, IBM Watson Research Center. Summer 1982.	
Enrichment Programs	Secretary, Central Jersey's Area Teaching Committee of the Regional Bahá'í Council for the Northeast. Organized four meetings to mobilize teachers in 2015-2016.	
	Seminar leader for the NSA-supported SUMMER PROGRAM FOR WOMEN IN MATHEMATICS at The George Washington University. Summer 2005.	
	Seminar leader in the NSF-supported SUMMER MATHEMATICS INSTITUTE FOR WOMEN UNDERGRADUATES at Mills and Berkeley. Summers 1992 and 1993.	

- Ph.D. Thesis** *Combinatorial Properties of Partially Ordered Sets Associated with Partitions and Finite Abelian Groups*, MIT, May 1986.
- M.S. Thesis** Latent Dirichlet Allocation for a Corpus of Prayers, UChicago, June 2013.
- Publications** A unimodality result in the enumeration of subgroups of a finite abelian group, *Proc. Amer. Math. Soc.* **101** (1987) 771–775.
- Rational generating functions for enumerating chains of partitions, *J. Combinatorial Theory* **A50** (1989) 132–161.
- (with Doug Wiedemann and Neal Zierler), classified paper on an algorithm developed at SCAMP 1989 at IDA’s Center for Communications Research.
- Classified paper on a problem researched at SCAMP 1990 at IDA’s Center for Communications Research.
- (with Neil White), classified paper on White’s algorithm that placed second in a contest at SCAMP 1990 at IDA’s Center for Communications Research.
- The q -log-concavity of q -binomial coefficients, *J. Combinatorial Theory* **A54** (1990) 54–63.
- Generalized flags in finite abelian p -groups, *Discrete Applied Math.* **34** (1991) 67–81.
- (with Alfred W. Hales), Nonnegative Hall polynomials, *J. Algebraic Combinatorics* **2** (1993) 125–135.
- Subgroup lattices and symmetric functions, *Memoirs Amer. Math. Soc.*, Volume 112, Number 539, November 1994.
- (with Steven D. Fischer, F. Miller Maley, and Andrew Mayer), classified paper on research carried out during SCAMP 1994 at IDA’s Center for Communications Research.
- Order analogues and Betti polynomials, *Advances in Math.* **121** (1996) 62–79. Also available as DIMACS Technical Report 91-37.
- A Seminar on Linear Optimization, *Women in Mathematics: Scaling the Heights*, edited by Deborah Nolan, MAA Notes **46** (1997) 59–63.
- (with A. Björner and A.O. Matveev), Note on a combinatorial application of Alexander duality, *J. Combinatorial Theory* **A80** (1997) 163–165.
- (with Alfred W. Hales), Generalized flags in p -groups, *Computers and Mathematics with Applications* **39** (2000) 67–76.
- (with Haverford student Pat Flanigan), A note on log-convexity of q -Catalan numbers, *Annals of Combinatorics* **11** (2007) 369–373.
- (with Daniel Strauss, Bridget Alligood and Laurie Butler), Analyzing Angular Distributions for Two-Step Dissociation Mechanisms in Velocity-Map Imaging, *J. Physical Chemistry* **117** (2013) 7102–7106.

**Invited
Addresses**

AMS special session on the many lives of lattice theory and the theory of ordered sets with connections to combinatorics.

Joint Mathematics Meetings, San Diego, California. January 2002.

Classical Combinatorics: A Conference in Honor of Dominique Foata.

Temple University, Philadelphia, Pennsylvania. July 2000.

AMS special session on algebraic combinatorics.

Southeastern Section Meeting, Louisville, Kentucky. March 1998.

Special session on finite groups and representation theory.

Joint Meeting of the American Mathematical Society, London Mathematical Society and South African Mathematical Society. Pretoria, South Africa. June 1997.

Workshop on Enumeration and Partially Ordered Sets

Mathematical Sciences Research Institute. Berkeley, California. October 1996.

Joint Introductory Workshop on Combinatorics and Low-dimensional Topology.

Mathematical Sciences Research Institute. Berkeley, California. August 1996.

AMS special session on identities and enumeration.

Southeastern Section Meeting, Richmond, Virginia. November 1994.

AMS special session on q -series, at the Minneapolis Mathfest.

Summer Meeting, Minneapolis, Minnesota. August 1994.

Jerusalem Combinatorics 1993.

Hebrew University of Jerusalem. May 1993.

AMS special session on algebraic combinatorics.

Southeastern Section Meeting, Knoxville, Tennessee. March 1993.

Workshop on Combinatorics and Discrete Geometry.

Mathematical Sciences Institute, Cornell University. July 1991.

AMS special session on simplicial complexes associated to finite groups and their representations.

Central Section Meeting, South Bend, Indiana. March 1991.

Symposium for the 20th anniversary of the Association of Women in Mathematics featuring ten women within a decade of their Ph.D.

Joint Mathematics Meetings, San Francisco, California. January 1991.

The International Conference on Commutative Algebra and Combinatorics.

Satellite Conference of the International Congress of Mathematicians–1990.

Nagoya, Japan. August 1990.

Capital City Conference on Combinatorics and Theoretical Computer Science.

The George Washington University. May 1989.

AMS special session on algebraic combinatorics.

Central Section Meeting, East Lansing, Michigan. March 1988.

AMS special session on combinatorics and group representations.

Joint Mathematics Meetings, San Antonio, Texas. January 1987.

- Special Session Organized** AMS special session entitled “Algebraic combinatorics of posets and tableaux”, organized with Curtis Greene, an hour speaker at the meeting. Southeastern Section Meeting, Greensboro, North Carolina. November 1995.
- Minisymposia Organized** Symposium entitled “Algebraic combinatorics”, organized with Curtis Greene. 1993 SIAM Annual Meeting. Philadelphia, PA. July 1993.
- Symposium entitled “Algebraic combinatorics: A bridge to pure mathematics”. Sixth SIAM Conference on Discrete Mathematics. Vancouver, BC. June 1992.
- Symposium entitled “Combinatorics meets (and joins) algebra and topology”. Second International Conference on Industrial and Applied Mathematics. Washington, DC. July 1991.
- Professional Service** Member of SAT I Mathematics Development Committee, which advises the Educational Testing Service on expansion of test content and revision of calculator policy. August 2002 – May 2004.
- Served on Visiting Committees to the mathematics departments of DePauw University (2002), Mills College (1996), Pomona College (1993).
- Wrote honors examination and conducted follow-up oral examinations for Oberlin (2000 for math) & Swarthmore (2010 for combinatorics and 2011 for statistics).
- Member of FOCUS Committee for IDA Centers for Communications Research, which evaluates mathematical contributions of the two centers for the president of the Institute for Defense Analyses. November 1997 – May 2000.
- Reviewed the SAT I Mathematics test or the PSAT Mathematics test for the Educational Testing Service, each year 1996–1999, and reviewed math items for the College Board, 2014–15, 2015–16, 2017–18 and 2018–19.
- College Service** Chair of Institutional Animal Care and Use Committee, 2013–2014.
- Associate Provost, 2004–2005.
- Chair of the Department of Mathematics, 1995–96, 1998–2000, Spring 2004 and 2007–08.
- Co-wrote successful grant application to the Zimmer Corporation for Department of Mathematics funds, 1996–97.
- Served on *ad hoc* (search) Committee for Department of Mathematics at Bryn Mawr College, 2017–18, for Department of Mathematics at Haverford, 2006–07, 2002–03 and 1997–98, for Department of Physics, 2005–06, and for Department of Sociology, 1995–96.
- Elected Member of Academic Council and representative to the Board of Managers, 1993–95.
- Launched concentration in Mathematical Economics, 1994.

Curriculum Development	Developed new courses on Categorical Data Analysis, Applications of Calculus to Probability Distributions, Statistical Methods and their Applications, and Linear Optimization and Game Theory, Point-Set Topology and the Fundamental Group, Simplicial Homology Theory, Enumerative Combinatorics, Finite Reflection Groups.
Graduate Teaching	Enumerative Combinatorics at Berkeley, 1996–97. Numerical Linear Algebra at UChicago, Winter 2009.
Recent Senior Papers Directed	<p>Erica Blum, Advanced Encryption Standard, 2017–18.</p> <p>Trista Cao, Bias-Variance Tradeoff, 2017–18.</p> <p>Siyang Wang, Hidden Markov Models and Dirichlet Processes, 2017–18.</p> <p>Leqi Liu, Latent Dirichlet Allocation, co-advised with Miao, 2016–17.</p> <p>Yichen Wang, Generalized exponential distribution, with Stromquist, 2016–17.</p> <p>Grant Finn, Application of Principal Component Analysis to baseball, 2015–16.</p> <p>Ting Zhu, Survey of the (Special) Number Field Sieve, 2015–16.</p> <p>Josh Lederman, Latent Dirichlet Allocation and Correlated Topic Model, 2014–15.</p> <p>Baijie Lu (BMC), Simplex visualization of documents under topic models, 2015.</p> <p>Ravin Rijhsinghani, Hidden Markov models and financial time series, 2014–15.</p> <p>Ziyue Shuai, Exploring LDA with 19th century French poetry, 2014–15.</p> <p>Siqi Wang, Gibbs sampler and its applications, 2014–15.</p> <p>Mengjie Pan, Generalized linear models and mixed-effects regression models, 2013–14.</p> <p>Yatong Li, Bayesian statistics and applications in genetics, 2013–14.</p> <p>Daniel Stackman, Hierarchical Dirichlet process hidden Markov models, 2013–14.</p> <p>Rebecca Knowles, Latent Dirichlet Allocation, 2011–12.</p> <p>Sam Strauch, Order statistics, 2011–12.</p> <p>Noah Lavine, Graphical models, 2010–11.</p> <p>Jim McClain, Statistical language models, 2010–11.</p> <p>Andrew Smith, Nash implementation of social choice rules, 2010–11.</p> <p>Erica Greene, Expectation-maximization algorithm & Kullback-Leibler, 2009–10.</p> <p>Conor Weiss, Adelman’s algorithm and Diffie-Hellman key exchange, 2009–10.</p> <p>Sunny Singh, Continued fraction factorization, 2009–10.</p> <p>Chris Smith, Evolutionary game theory, 2007–08.</p> <p>Evan Cording, Discrete Fourier transform, 2006–07.</p> <p>Sumana Shrestha, An application of hidden Markov models to finance, 2006–07.</p> <p>Jane Carlen, Milnor’s proof of the Brouwer fixed point theorem, 2005–06.</p> <p>Pat Flanigan, Log-convexity results for q-Catalan numbers, 2005–06.</p> <p>Andrea Robbett, Nash’s equilibrium theorem, 2004–05.</p> <p>Johnicholas Hines, Graphical reformulation of a result in lambda calculus, 2003–04.</p> <p>Sonia Nurkse, Bayesian statistics: posterior distribution of the mean, 2003–04.</p> <p>Christina Oran, An application of representation theory to chemistry, 2003–04.</p> <p>Rob Pickard, Cryptanalysis of DES, 2000–01.</p> <p>Rohit Apt, Cryptology and language modeling, 2000–01.</p> <p>Miriam Sztatowski, An application of the Borsuk-Ulam Theorem, 1999–2000.</p> <p>Majka Ordman, Topics in graph theory, 1999–2000.</p> <p>Steve Walzer, Numerical solution of differential equations via Runge-Kutta, 1998–99.</p> <p>Whitney Barnett, Enumeration of isohedral tilings of the plane, 1998–99.</p> <p>Scott Kravitz, Toric varieties and the combinatorics of simplicial polytopes, 1997–98.</p> <p>Cal Fishkin, Linear programs related to rate control in networks, 1997–98.</p> <p>Selin Somersan, Markov chains applied to protein folding, 1997–98.</p>

**Talks on Work
with Students**

Diurnal Temperature Range: An Independent Investigation using Statistics, Pi Mu Epsilon annual presentation, Elizabethtown College, April 2017

Hidden themes in 346 Bahá'í prayers, found with the statistical topic model, Latent Dirichlet Allocation, 37th Annual Conference of the Association for Bahá'í Studies, August 2013.

Log-convex sequences in combinatorics, Mathematics Colloquium, DePaul University, May 2009.

Hidden Markov models of natural language and stock market indices, Ross Program Reunion, Ohio State University, July 2007.

Log-convexity of q -Catalan numbers, The 4th International Conference on Permutation Patterns, Reykjavik University, June 2006.