

Judy Leavitt Walker

Current CV as of November 4, 2011

Education

Ph.D. in Mathematics **University of Illinois**, Urbana, IL; May, 1996
Dissertation: *Algebraic Geometric Codes over Rings*;
Advisor: Nigel Boston

M.S. in Mathematics **University of Illinois**, Urbana, IL; May, 1992

B.S. in Mathematics **University of Michigan**, Ann Arbor, MI; May, 1990
with Honors

Employment

Professor of Mathematics, University of Nebraska—Lincoln; 2006 –
Graduate Chair, 2008–2011; **Chair**, 2012 –.

Visiting Professor, École Polytechnique Fédérale de Lausanne (Switzerland); Aug. – Oct., 2011

Associate Professor of Mathematics, University of Nebraska—Lincoln; 2001 – 2006

Assistant Professor of Mathematics, University of Nebraska—Lincoln; 1996 – 2001

Teaching Assistant/Teaching Fellow, University of Illinois; 1990 – 1996

Research Interests

Algebraic coding theory: codes on graphs, algebraic geometry codes, codes over rings, neural coding

Awards

Mathematical Association of America George Pólya Lecturer, 2009-2011.

The MAA has two Pólya Lecturers at any time, serving staggered two-year terms. Each MAA Section is able to invite a Pólya Lecturer to speak at its Sectional Meeting once every 5 years, on a rotating basis.

Deborah and Franklin Tepper Haimo Award for Distinguished College or University Teaching of Mathematics, 2006.

Up to three awards are given nationally each year by the MAA.

MAA Sectional Award for Distinguished Teaching, 2003.

One Award is given each year in the Nebraska-Southeast South Dakota Section of the MAA.

UNL Scholarly Teaching Award, 2000.

One Scholarly Teacher Award is presented each year to a University of Nebraska-Lincoln faculty member.

UNL College of Arts and Sciences Distinguished Teaching Award, 2000.

Up to six faculty members from the UNL College of Arts and Sciences are selected each year to receive Distinguished Teaching Awards.

UNL Parents Association and the Teaching Council, 1999, 2000, 2001, 2008, 2010.

Certificate of Recognition for Contributions to Students

Irving Reiner Memorial Award, 1996.

Outstanding Student in Algebra at the University of Illinois

Memberships in Professional Societies

American Mathematical Society

Association for Women in Mathematics

Institute of Electrical and Electronics Engineers and IEEE Information Theory Society

Mathematical Association of America

Society for Industrial and Applied Mathematics and (AG)² (Algebraic Geometry Activity Group)

Grants

Research Grants

National Science Foundation, \$176,419, 2009-2012.

Graph-Based Codes

National Science Foundation, \$91,100, 2007-2008.

SGER: A Unifying Theory for Capacity-Achieving Codes

National Science Foundation, \$147,651, 2006-2009.

Algebraic Aspects of Modern Coding Theory

National Science Foundation, \$129,406, 2003-2006.

Problems in Algebraic Coding Theory

National Science Foundation, \$89,256, 2000-2003.

Coding Theory with Methods from Algebraic Geometry and Number Theory

This amount includes a \$11,520 supplement awarded for graduate student support.

National Science Foundation, \$45,936, 2000-2003.

Topics in Commutative Algebra and Algebraic Geometry

(with the 5 other members of the Commutative Algebra/Algebraic Geometry research group at UNL)

National Science Foundation, \$18,000, 1997-2000.

Topics in the Theory of Algebraic Geometric Codes

UNL Research Council Summer Research Fellowship, \$6500, Summer 1999.

Applications of Algebraic Geometry to Coding Theory

Grants to Support Outreach and Education

NSF EMSW21-MCTP Grant (with T. Marley and A. Donsig), \$2,300,000 (approximately), 2009-2014.

Nebraska Mentoring Through Critical Transition Points

This grant funds the Nebraska IMMERSE program and provides four graduate traineeships per year as well as funds for an undergraduate program called “UTRIM” and the Nebraska Conference for Undergraduate Women in Mathematics. The grant belongs to the department. Tom Marley was the lead writer of the proposal and is listed as the lead PI.

NSF EMSW21-MCTP Grant (with T. Marley and A. Donsig), \$2,500,000, 2004-2009.

Nebraska Mentoring Through Critical Transition Points

This grant funds the Nebraska IMMERSE program and provides six graduate traineeships per year as well as funds for undergraduate research, summer workshops for recent UNL PhDs, the Regional Workshop, and the Nebraska Conference for Undergraduate Women in Mathematics. The grant belongs to the department but I was the lead writer of the proposal and I am listed as the lead PI.

NSA Special Projects Grant (with G. Hines), \$10,000, 2005-2006.

All Girls/All Math Summer Camp for High School Girls

This grant supported AGAM 2005.

USDoE GAANN Grant (with R. Wiegand, L. Bellows, J. Meakin, D. Pitts and M. Walker), \$522,624, 2009-2012.

Graduate Assistantships in Areas of National Need

This grant provides five graduate traineeships per year. Roger Wiegand is the lead PI on the grant, and I am a co-PI.

USDoE GAANN Grant (with R. Wiegand, L. Bellows, J. Meakin, D. Pitts and M. Walker), \$633,360, 2006-2009.

Graduate Assistantships in Areas of National Need

This grant provides five graduate traineeships per year. Roger Wiegand is the lead PI on the grant, and I am a co-PI.

USDoE GAANN Grant (with R. Wiegand, L. Bellows, W.J. Lewis and M. Walker), \$462,288, 2003-2006.

Graduate Assistantships in Areas of National Need

This grant provided four graduate traineeships per year. Roger Wiegand was the lead PI on the grant, but I was the lead writer on the proposal and was a co-PI.

NSF Conference Grant (with the organizing committee), \$45,000, 2001-2004.

Nebraska Conference for Undergraduate Women in Mathematics

NSA Conference Grant (with organizing committee), \$25,000, 2001; \$15,000, 2002 and 2003; \$18,000, 2004; \$10,000, 2005 and 2006; \$15,000, 2007; \$18,000, 2008, 2009, 2010, 2011.

Nebraska Conference for Undergraduate Women in Mathematics

Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring, \$10,000, 1998-2000.

I was the Principal Investigator for this NSF award, which honored the entire UNL Department of Mathematics and Statistics. Funds from this award went toward the first two Nebraska Conferences for Undergraduate Women in Mathematics.

AMS Epsilon Program Grant (with G. Hines), \$5000 each year for 2000-2003; \$2500 each year for 2004-2005; \$3000 for 2006.

All Girls/All Math

MAA Tensor Program Grant (with G. Hines), \$5000 each for 1997-1998 and 1999-2000.

Women in Mathematics in Nebraska

UNL Diversity Enhancement Grant (with the organizing committee), \$2500, 1999-2000.

Nebraska Conference for Undergraduate Women in Mathematics

Travel Grants

AMS Travel Award, \$1000, 2000.

to attend *AMS Mathematical Challenges of the 21st Century*, UCLA, August 7–12, 2000.

AWM Travel Grant, \$750, 2000.

to attend *Kodierungstheorie* at Oberwolfach, April 30–May 6, 2000.

Publications

Note on refereed papers: All publications are refereed, with the exception of [6], [12], [13], [19], [24], [27], [28] and [32]. Publications [6], [12], [19], [24] and [32] are invited papers for conferences and workshops; [27] is an invited chapter of a book; publications [13] and [28] are available on my website.

Note on collaborative work: All joint papers below, except [24] and [32] are the result of equal contributions among the collaborators. It is the custom in mathematics to list authors alphabetically by last name. I was the primary author on [24] and, at the insistence of my coauthors, my name is listed first. The results of [32] are primarily from the PhD thesis of my student, Deanna Dreher. I expect that the journal paper version of this paper will list her as the sole author. Papers [25], [28], [29] and [30] are collaboration between Professor Lance Pérez, myself, and our students. Following an engineering convention, we have listed the students first (alphabetically by last name) and then ourselves (alphabetically by last name) on those papers.

- [32] *Connections between computation trees and graph covers*; (with D.T. Dreher), **Proceedings of the 2009 Information Theory and Applications Workshop**, San Diego, CA; February 2009.
- [31] *Towards universal cover decoding*; (with N. Axvig, D.T. Dreher, K. Morrison, E. Psota and L.C. Pérez), **Proceedings of the 2008 International Symposium on Information Theory and its Applications**, Auckland, New Zealand; December 2008.
- [30] *Average min-sum decoding of LDPC codes*; (with N. Axvig, D.T. Dreher, K. Morrison, E. Psota and L.C. Pérez), **2008 International Symposium on Turbo Codes and Related Topics**, Lausanne, Switzerland; September 2008.
- [29] *Analysis of connections between pseudocodewords*; (with N. Axvig, D.T. Dreher, K. Morrison, E. Psota and L.C. Pérez), **IEEE Transactions on Information Theory**, **55** (2009) 4099-4107.
- [28] *A universal theory of decoding and pseudocodewords*; (with N. Axvig, D.T. Dreher, K. Morrison, E. Psota and L.C. Pérez), SGER Technical Report 0801, University of Nebraska–Lincoln, March 2008. Available online at <http://www.math.unl.edu/~jwalker>
- [27] *Algebraic geometric codes over rings*; (with K. Bartley), in **Advances in Algebraic Geometry Codes**, Series on Coding Theory and Cryptography (World Scientific), March 2008.
- [26] *LDPC codes from voltage graphs*; (with C.A. Kelley), in **2008 International Symposium on Information Theory**, Toronto, Ontario; July 2008.
- [25] *A universal theory of pseudocodewords*; (with N. Axvig, E. Price, E. Psota, D. Turk and L.C. Pérez), in **Proceedings of the 45th Annual Allerton Conference on Communication, Control and Computing**, Monticello, IL; October 2007.
- [24] *Promoting undergraduate research in mathematics at the University of Nebraska – Lincoln*; (with G. Ledder, R. Rebarber and G. Woodward), in **Promoting Undergraduate Research in Mathematics**, J. Gallian, ed.
- [23] *Women in mathematics in Nebraska*; (with W.J. Lewis), accepted for publication in **Models that Work: Building Diversity in Advanced Mathematics**, P. Hale and A. Herzig, eds., March 2008.
- [22] *s-extremal additive \mathbb{F}_4 codes*; (with E.P. Bautista, P. Gaborit and J.-L. Kim), **Advances in Mathematics of Communications**, **1**, (2007) 111-130.
- [21] *s-extremal additive \mathbb{F}_4 codes*; (with E.P. Bautista, P. Gaborit and J.-L. Kim), in **Proceedings of the IEEE International Symposium on Information Theory**, Seattle, WA, July 9-14, 2006.
- [20] *Characterizations of pseudo-codewords of LDPC codes*; (with R. Koetter, W. Li and P. Vontobel), **Advances in Mathematics**, **213** (2007) 205-229.

- [19] *Pseudo-codewords of cycle codes via zeta functions*; (with R. Koetter, W. Li and P. Vontobel), in **Proceedings of the IEEE Information Theory Workshop**, San Antonio, TX, Oct. 24-29, 2004.
- [18] *Nonbinary quantum error-correcting codes from algebraic curves*; (with J.-L. Kim), **Discrete Math**, **308** (2008), 3115–3124.
- [17] *Mentors and Role Models*; in **Complexities: Women in Mathematics**, B.A. Case and A.L. McDonald, eds. Princeton University Press, 2004.
- [16] *Applications of list decoding to tracing traitors*; (with A. Silverberg and J. Staddon), **IEEE Transactions on Information Theory**, **49** (2003) 1312–1318.
- [15] *Homogeneous weights and exponential sums*; (with J.-F. Voloch), **Finite Fields and Their Applications**, **9** (2003) 310–321.
- [14] *Efficient traitor tracing algorithms using list decoding*; (with A. Silverberg and J. Staddon), in *Advances in Cryptology — ASIACRYPT 2001*, Lecture Notes in Computer Science **2248**, (2001) 175-192.
- [13] *A critical look at self-dual codes*; in *Proceedings of the 38th Annual Allerton Conference on Communication, Control, and Computing*, (2001) 1019-1028.
- [12] *Codes on Curves*; prepared for a Mathematical Association of America Notes volume (proceedings of the MAA Short Course on Coding Theory, UCLA, August 1-2, 2000). Preprint, August 2000.
- [11] *Constructing critical indecomposable codes*; **IEEE Transactions on Information Theory**, **47** (2001) 1780-1795.
- [10] *Codes and Curves*; Student Mathematical Library, IAS/Park City Mathematical Subseries, **7**. American Mathematical Society, Providence, RI; 2000.
- [9] *Codes over rings from curves of higher genus*; (with J.-F. Voloch), **IEEE Transactions on Information Theory**, **45** (1999) 1768-1776.
- [8] *Two-groups with few conjugacy classes*; (with N. Boston), **Proc. Edinburgh Math. Soc. (2)** **43** (2000), 211-217.
- [7] *Euclidean weights of codes from elliptic curves over rings*; (with J.-F. Voloch), **Trans. Amer. Math. Soc.**, **352** (2000) 5063–5076.
- [6] *Lee weights of $Z/4Z$ codes from elliptic curves*; (with J.-F. Voloch), in **Codes, Curves, and Signals: Common Threads in Communications** (A. Vardy, ed.), Boston: Kluwer Academic Publishers. (1998) pp. 53-62.
- [5] *Algebraic geometric codes over rings*; **Journal of Pure and Applied Algebra**, **144** (1999) 91-110.
- [4] *The Nordstrom Robinson code is algebraic geometric*; **IEEE Transactions on Information Theory**, **43** (1997) 1588-1593.
- [3] *A new approach to the main conjecture on algebraic-geometric MDS codes*; **Designs, Codes, and Cryptography**, **9** (1996) 115-120.
- [2] *The proportion of fixed-point-free elements of a transitive permutation group*; (with N. Boston, W. Dabrowski, T. Foguel, P. Gies, D. Jackson, and D. Ose), **Communications in Algebra**, **2** (1993) 3259-3275.
- [1] *Rewriteability in finite groups*; (with G. Sherman and M. Walker), **American Mathematical Monthly**, **99** (1992) 446-452.

Invited Lectures

Codes are everywhere!

Parsons Lecture, University of North Carolina – Asheville, April 2012.

Neural codes from a coding theory perspective

Arbeitsgemeinschaft in Codierungstheorie und Kryptographie, University of Zürich (Switzerland), October 2011.

A coding theory perspective on combinatorial neural codes

Workshop on Algebraic Coding Theory, Centre Interfacultaire Bernoulli, École Polytechnique Fédérale Lausanne (Switzerland), September 2011.

Codes on graphs: Shannon's challenge and beyond,

University of Tennessee Colloquium, April 2011.

What color is my hat? And what does that have to do with my ipod?,

University of Tennessee Junior Colloquium, April 2011.

Algebraic geometry and coding theory: more than just algebraic geometry codes

Solving Polynomial Equations Workshop, KTH Stockholm, February 2011.

What color is my hat? And what does that have to do with my CD player?

Carleton Summer Program for Women Colloquium, June 2010.

Codes on Graphs: Shannon's Challenge and Beyond

Polya Lecture, Texas Section of the MAA, Abeline Christian University, Abeline, TX, April 2010.

Codes on Graphs: Shannon's Challenge and Beyond

Polya Lecture, Rocky Mountain Section of the MAA, Colorado State University, Ft. Collins, CO, April 2010.

Codes on Graphs: Shannon's Challenge and Beyond

Polya Lecture, Kansas Section of the MAA, Washburn University, Topeka, KS, March 2010.

What color is my hat? And what does that have to do with my CD player?

Kansas Section of the MAA, Washburn University, Topeka, KS, March 2010.

The importance of determining what's important

UNL Advance "Paths to Success" Luncheon, February 2010.

Codes on Graphs: Shannon's Challenge and Beyond

Polya Lecture, Northeastern Section of the MAA, Western New England College, Springfield, MA, November 2009.

Codes on Graphs: Shannon's Challenge and Beyond

Heilbronn Annual Conference, University of Bristol (England), September 2009.

Codes on Graphs

Kalamazoo College Jennifer Mills Lecture, May 2009.

What color is my hat? And what does that have to do with my CD player?

Kalamazoo College Colloquium, May 2009.

The height of knowledge

UNL Graduate Commencement, April 2009.

What color is my hat? And what does that have to do with my CD player?

Seminar for Summer Mathematics Institute, Cornell University; July 2008.

Programs for students at Nebraska

Special Session on REUs and Graduate Schools; Seminario Interuniversitario de Investigación en Ciencias Matemáticas (SIDIM), University of Puerto Rico at Carolina, Carolina, PR; February 29–March 1, 2008.

An application of the edge zeta function to coding theory

AMS Special Session on Zeta Functions of Graphs, Ramanujan Graphs, and Related Topics; San Diego, CA; January 6, 2008.

LDPC codes from voltage graphs

AMS Special Session on Algebraic Coding Theory (in honor of Harold N. Ward's retirement); Chicago, IL; October 5–6, 2007.

Lectures on coding theory

This series of seven 45-minute lectures was given at the Summer School on Coding Theory, Sophus Lie Conference Center, Nordfjordeid, Norway; June 18–22, 2007.

Pseudocodeword connections

Plenary talk at “Complexity, Coding and Communications” Workshop, IMA, University of Minnesota, Minneapolis, MN; April 16–20, 2007.

Towards explaining decoding errors for LDPC codes

AMS Special Session on Coding Theory and its Applications, New Orleans, LA; January 5, 2007.

Degenerate Stabilizer Codes

AMS Special Session on Algebraic Coding Theory—Honoring the Retirement of Vera Pless, Cincinnati, OH; October 21–22, 2006.

Pseudo-Codewords of LDPC Codes

Plenary talk at PIMS “Sequences and Codes” conference, IRMACS, Simon Fraser University, Vancouver, BC; July 17–21, 2006.

What color is my hat? And what does that have to do with my CD player?

Seminar for Summer Mathematics Institute, Cornell University; June 21, 2006.

Pseudocodewords of LDPC codes

Rocky Mountain algebraic combinatorics seminar, Colorado State University, Fort Collins, CO; February 24, 2006.

Supporting Women in Mathematics at the University of Nebraska–Lincoln

MAA Session on “Models that Work: Building Diversity in Advanced Mathematics” at the Joint Mathematics Meetings, San Antonio, TX; January 13, 2006.

The Joy of Teaching The Joy of Numbers

MAA Session on “Presentations by Teaching Award Recipients” at the Joint Mathematics Meetings, San Antonio, TX; January 14, 2006.

An NSF Mentoring through Critical Transition Points (MCTP) Program

Presentation to the Conference Board of the Mathematical Sciences, Washington, DC; December 2, 2005.

LDPC codes and their pseudocodewords

Invited address at AMS Sectional Meeting in Lincoln, NE; October 23, 2005.

Characterizations of pseudocodewords of LDPC codes

Arithmetic, Geometry, and Coding Theory - 10, Luminy-Marseilles, France; September 26–30, 2005.

Bridging the gap to graduate work

I co-presented with J. Peter May of the University of Chicago in this session of the “Engaging young mathematicians” workshop in Washington, DC on August 13, 2005.

The mathematics of flight

This lecture was given to the All Girls/All Math participants at UNL, July 19, 2005.

Choosing a graduate school

This lecture was given to the REU participants at Brigham Young University, July 14, 2005.

What color is my hat? And what does that have to do with my CD player?

Seminar for REU program, Brigham Young University; July 13, 2005.

Pseudocodewords and Zeta Functions

Colloquium, University of Wisconsin, Madison, WI; February 25, 2005.

Shadows of self-dual additive codes over $GF(4)$

Number Theory Seminar, University of Wisconsin, Madison, WI; February 24, 2005.

A conversation about women in mathematics and graduate school

This presentation was given by invitation to the AWM Student Chapter at the University of Illinois at Chicago on February 21, 2005.

Pseudocodewords, cycle codes, and the edge zeta function of graphs

AMS Sectional Meeting – Special Session on Coding Theory and Applications, Evanston, IL; October 23-24, 2004.

Lattices and self-dual codes

Number Theory Seminar, Penn State University, State College, PA; April 15, 2004.

The Joy of Numbers

This lecture was given by invitation as part of the Teaching Seminar at Penn State University on April 13, 2004.

Shadow enumerators and self-dual codes

AMS Sectional Meeting – Special Session on Algebraic Coding Theory, Athens, OH; March 26-27, 2004.

Weight enumerators and self-dual codes

AMS/MAA Joint Meetings – Special Session on Coding and Design-Theoretic Applications of Polynomials, Phoenix, AZ; January 8, 2004.

From hats to Hilbert space: a tour of coding theory

Colloquium, University of Notre Dame, Notre Dame, IN; November 5, 2003.

From hats to Hilbert space: a tour of coding theory

Colloquium, University of Illinois, Urbana, IL; October 17, 2003.

Some Current Problems in Coding Theory

This series of lectures was given as a NSF- and DIMACS-sponsored “Reconnect” Conference at Salem State College, Salem, MA; June 15-21, 2003. The audience was faculty from primarily teaching focused institutions and I am the Principal Lecturer for the conference. The participants wrote modules to use in their teaching and hopefully, also developed a renewed spark in pursuing their own research or research with undergraduates.

Nonbinary quantum codes from error-correcting codes

Arithmetic, Geometry, and Coding Theory - 9, Luminy-Marseilles, France; May 23, 2003.

What color is my hat? And what does that have to do with my CD player?

This lecture was given to the high school and middle school math teachers of the Lincoln Public School system, Scott Middle School, Lincoln, NE; December 5, 2002.

Codes, curves, rings, and some exponential sums

Number Theory Seminar, University of Colorado, Boulder, CO; February 27, 2002.

Homogeneous weights and exponential sums

2002 AMS/MAA Joint Meetings – Special Session on Algebraic Coding Theory, San Diego, CA; January 6-9, 2002.

A structural approach to coding theory

KUMUNU 3, Lawrence, KS; September 29, 2001.

Critical indecomposable codes: Constructions and Applications

Sixth International Conference on Finite Fields and Applications, Oaxaca, Mexico; May 21-25, 2001.

Traitor tracing algorithms using list decoding

Number Theory Seminar, University of Texas, Austin, TX; May 1, 2001.

A critical look at coding theory

This talk was given in a combined meeting of the Special Session on Commutative Algebra and Algebraic Geometry and Special Session on Combinatorics, at the Third Annual UNL Regional Workshop in the Mathematical Sciences, Lincoln, NE; October 28, 2000.

Applications of low genus curves to the theory of error-correcting codes

AMS Sectional Meeting – Special Session on Low Genus Curves and Applications, San Francisco, CA; October 21-22, 2000.

A critical look at self-dual codes

38th Annual Allerton Conference on Communication, Control, and Computing, Monticello, IL; October 4-6, 2000.

Codes on Curves

This 90-minute lecture was part of the MAA Short Course on Coding Theory at UCLA; August 1-2, 2000. Approximately thirty mathematicians attended.

Making Nonlinear Codes Linear: A mathematician finds happiness

Kalamazoo College Colloquium, Kalamazoo, MI; April 7, 2000.

Creating Excellence: Nebraska and its Presidential Award

This lecture was one of nine invited presentations at the Conference on Models for Integrating Research into the Undergraduate Experience, Tucson, AZ; February 25, 2000.

A categorical approach to the study of self-dual codes

AWM Workshop, Washington, DC; January 22, 2000.

Codes and Curves

This was a plenary lecture at the Second Regional Workshop in Mathematics, Lincoln, NE; November 19, 1999.

Codes and Curves

This sequence of eight lectures was given for the Undergraduate Program of the IAS/PCMI Mentoring Program, Princeton, NJ; May 17-27, 1999. Approximately 75 people attended each lecture, including the undergraduate students in the program as well as a variety of postdocs, graduate students, IAS members (including at least one biologist), and mathematics researchers from the Institute for Defense Analysis.

Computing parameters of codes from curves over rings

Coding Theory Seminar, University of Notre Dame, Notre Dame, IN; April 13, 1999.

Exponential sums with applications to codes over rings

AMS Sectional Meeting – Special Session on Diophantine Equations, Inequalities and Related Arithmetic Problems, Urbana, IL; March 18-21, 1999.

The parameters of trace codes from curves over rings

AMS Sectional Meeting - Special Session on Arithmetic Algebraic Geometry, Tucson, AZ; November 14-15, 1998.

Recent progress in the algebraic geometric approach to codes over rings

AMS Sectional Meeting - Special Session on Algebraic Coding Theory, Chicago, IL; September 12-13, 1998.

ALL GIRLS/ALL MATH Summer Math Camp

UNL Department of Mathematics and Statistics Centennial Celebration - Special Session on Mathematics Education, Lincoln, NE; May 14-16, 1998.

An exponential sum arising from codes defined via curves over rings

Number Theory Seminar, University of Michigan, Ann Arbor, MI; April 13, 1998.

Error Correcting Codes

Undergraduate Colloquium, University of Michigan, Ann Arbor, MI; April 13, 1998.

Codes from curves

University of Nebraska at Omaha Colloquium; February 18, 1998.

Applications of canonical lifts of elliptic curves to coding theory

AMS Sectional Meeting - Special Session on Diophantine Geometry, Albuquerque, NM; November 8, 1997.

Codes, curves and Galois rings

Departmental Colloquium, University of Illinois at Chicago; November 17, 1997.

Lee weights of codes from elliptic curves

Codes, Curves and Signals: Common Threads in Communications – BlahutFest (Conference in honor of Richard Blahut's 60th birthday), Urbana, IL; September 27, 1997.

Exponential sums and codes from elliptic curves over rings

AMS-SIAM Summer Research Conference on Applications of Curves over Finite Fields, Seattle, WA; July 30, 1997.

Exponential sums and Euclidean weights of codes from elliptic curves over rings

Arithmetic, Geometry, and Coding Theory - 6, Luminy-Marseilles, France; June 23, 1997.

Codes, curves, and Galois rings

Number Theory Seminar, University of Texas at Austin; April 17, 1997.

Panels

How One Can Become a Referee/Reviewer

I served on this Project NExT panel at the Joint Mathematics Meetings in January 2010.

Practical Talk about Mentoring

I served on this panel organized by the UNL Graduate Student Association on April 4, 2007.

Becoming a leader in your department

I served on this panel at the Joint Mathematics Meetings in New Orleans, LA, January 5, 2007.

The faculty member as teacher and scholar

I served on this panel for the 2005-2006 Project NExT Fellows, Albuquerque, August 2, 2005.

Mathematical careers and professional development

I served on this panel for the 2005 Nebraska IMMERSE program, July 21, 2005.

Choosing a Graduate School

This was a panel discussion at the Mathematics on the Northern Plains Conference, University of South Dakota, Vermillion, SD; March 29, 2003.

Writing Winning Proposals for Science, Mathematics, Engineering & Technology Graduate Students

Panelist, October 21, 2004.

Women in Science Conference

Panelist or Panel Moderator for this conference for high school girls held in Lincoln, NE in 2000, 2001, 2002, 2003.

Creative Research Techniques: getting your research off to a good start

Panelist for the 1999-2000 Project NExT Fellows; January 19, 2000.

Research Activities

Research Conferences Organized

Special Session on Advances in Coding Theory; January 4-7, 2012.

2012 AMS-MAA Joint Math Meetings; Boston, MA; co-organized with Gretchen Matthews (Clemson) and Sarah Spence Adams (Olin College).

Dagstuhl Seminar on Coding Theory; November 13-18, 2011.

I organized this workshop at the CS-counterpart to Oberwolfach jointly with Joachim Rosenthal (Zürich) and Amin Shokrollahi (Lausanne).

Special Session on Coding Theory; October 14-16, 2011.

AMS Sectional Meeting; Lincoln, NE; co-organized with Christine Kelley.

Special Session on Recent Trends in Coding Theory; January 5-8, 2009.

2009 AMS-MAA Joint Math Meetings; Washington, DC; co-organized with Gretchen Matthews (Clemson).

Special Session on Mathematical and Engineering Aspects of Coding Theory; October 21-23, 2005.

AMS Sectional Meeting; Lincoln, NE; co-organized with Lance Pérez (UNL Department of Electrical Engineering)

Special Session on Applications of Number Theory and Algebraic Geometry to Coding; October 2-4, 2003.

AMS Sectional Meeting; Boulder, CO; co-organized with David Grant (Colorado) and Felipe Voloch (Texas)

Special Session on Algebraic Coding Theory; April 7-9, 2000.

AMS Sectional Meeting; Notre Dame, IN; co-organized with Jay Wood (Western Michigan)

Special Session on Algebraic Geometry and Codes; September 29-October 1, 1997.

Thirty-Fifth Annual Allerton Conference on Communication, Control, and Computing; Monticello, IL; co-organized with Nigel Boston (Illinois)

First Lincoln Workshop in Cryptology and Coding Theory; June 1-4, 1997.

Lincoln, NE; co-organized with David Jaffe (UNL), Spyros Magliveras (UNL Department of Computer Science and Engineering) and Doug Stinson (UNL Department of Computer Science and Engineering)

UNL Research Council and Convocations Committee Scholars Hosted

Christine Heitsch; September 21-23, 2006.

David Grant; April 19-23, 2004.

Vera Pless; April 2-4, 2003.

Joachim Rosenthal; November 7-9, 2002.

Felipe Voloch; September 23-26, 1998.

also sponsored by *Discrete, Experimental, and Applied Mathematics*

Kristin Lauter; February 4-7, 1998.

Nigel Boston; August 27-31, 1997.

Invited Conference Participation

These are invitation-only conferences in which I have participated without speaking; see also the section **Recent Invited Research Talks**.

Women in Mathematics Symposium; May 3-5, 2009.

Linthicum, MD. Sponsored by the National Security Agency.

Coding Theory; December 2-8, 2007.

Oberwolfach, Germany

Kodierungstheorie; April 30-May 6, 2000.

Oberwolfach, Germany

Arithmetique, géométrie, théorie des codes (AGCT-7); October 25-29, 1999.

Luminy-Marseilles, France

Institute for Advanced Study / Park City Mathematics Institute; June 20-July 10, 1999.

Research Program on Arithmetic Algebraic Geometry; Park City, UT

Doctoral Students Supervised

Nathan Axvig, *Applications of Linear Programming to Coding Theory*

Nate received his PhD in 2010 and is now a tenure-track assistant professor at Virginia Military Institute.

Katherine Bartley, *Decoding Algorithms for Algebraic Geometric Codes over Rings*

Kathy received her PhD in 2006 and is now working with the Department of Defense in Fort Meade, MD.

Jennifer Everson Davis, *Algebraic Geometric Codes on Anticanonical Surfaces*

Jen received her PhD in 2007 and is now working with Rockwell Collins in Cedar Rapids, IA. Jen was co-advised by B. Harbourne.

Deanna (Turk) Dreher, *Pseudocodewords on Graph Covers and Computation Trees*

Deanna received her PhD in 2010 and is not actively seeking employment.

Matthew Koetz, *Algebraic Constructions of Low-Density Parity Check Codes*

Matt received his PhD in 2005 and took a tenure-track position at Nazareth College in Rochester, NY. He was tenured and promoted to associate professor in 2011.

Edward Loeb, *Quantum Error-Correcting Codes: From Stabilizer Codes to Induced Codes*

Ed received his PhD in 2006 and is now a tenure-track assistant professor at Southwestern College in Winfield, KS. Ed was co-advised by T. Marley.

Postdoctoral Scholars Supervised

Jon-Lark Kim

Jon-Lark was a postdoc at Nebraska for 2002–2005 and then took a tenure-track position at the University of Louisville in Louisville, KY. He was tenured and promoted to associate professor in 2010.

Doctoral Supervisory Committees

Current Students I am Chair of the Supervisory Committee (i.e., Doctoral Advisor) for Katherine Morrison and Zachary Roth; I am also co-Chair (with Carina Curto) for Nora Youngs.

Current Supervisory Committees I serve on the supervisory committees of Derek Boeckner (advisor: Jamie Radcliffe), Courtney Gibbons (advisor: Roger Wiegand), Katie Haymaker (advisor: Christine Kelley), Katie Johnson (advisor: Jamie Radcliffe), and Derrick Stolee (advisor: Stephen Hartke)

Former Supervisory Committees I served on the supervisory committees of Pari Ford (PhD 2008, advisor: Jamie Radcliffe), Josh Brown Kramer (PhD 2007, advisor: Jamie Radcliffe), Melissa (Hendrick) Luckas (PhD 2007, advisor: Sylvia Wiegand), Lori McDonnell (PhD 2011, advisor: Tom Marley), Tyler Seacrest (PhD 2011, advisor: Stephen Hartke), Luis Renato Abib Finotti (Texas PhD 2001, advisor: Felipe Voloch), Fan Jiang (UNL Department of Engineering PhD 2006, advisor: Lance Pérez), Eric Psota (PhD 2010, UNL Department of Electrical Engineering; advisor: Lance Pérez), Raghu Tewari (PhD 2011, UNL Department of Computer Science and Engineering; advisor: Vinod Variyam), Chen Xia (PhD 2007, UNL Department of Electrical Engineering; advisor: Lance Pérez), and Marcos Zarzar (Texas PhD 2006, advisor: Felipe Voloch).

Teaching Activities

Program Participation and Education Conferences Attended

Enacting Standards for Mathematical Practices Conference, October 21-22, 2011.

I was on the organizing committee for this conference held at UNL in honor of Jim Lewis.

Promoting Undergraduate Research in Mathematics, September 28-30, 2006.

This NSA/AMS workshop was held in Chicago, IL. In addition to participating in the conference, I led a small group discussion on “Overcoming Challenges”.

Engaging Young Mathematicians, August 12-13, 2005.

This NSF/AMS/MAA/SIAM/ASA conference was held in Washington, DC.

National Summit on the Mathematical Education of Teachers; November 2-3, 2001.

This conference was held in Tysons Corner, Virginia. I attended in preparation for my “Number Theory for Elementary and Middle School Teachers” course.

General Education in the Research University; June 2-3, 2000.

I was one of four UNL faculty members chosen to attend this conference at New York University.

Peer Review of Teaching Project; 1998-9.

As part of this campus-wide program, I led the departmental effort to reevaluate and revise Math 203, UNL’s “Contemporary Mathematics” course which is taken by about 350 students with non-technical majors each semester.

Shaping the Future; May 28-30, 1998.

I attended this conference in Lincoln, NE.

Project NExT; Fellow, 1996-7.

During my year as an active Project NExT Fellow, I co-wrote a section of Jim Leitzel’s article “Project NExT – The Third Year” which appeared in **FOCUS** (vol. 16, 1996). I also co-organized a session for Project NExT on Liberal Arts Mathematics in January, 1997.

Curriculum Development

Number Theory for Elementary and Middle School Teachers (Math 398)

This course is based on the Joy of Numbers course but aimed at an audience of pre-service elementary and middle school teachers. It was taught for the first time in Spring 2002. As with the Joy of Numbers course, a book of course notes was distributed to the students at the end of the semester.

The Joy of Numbers – Stalking the Big Primes (Math 189H)

I developed this course (based on a course originally developed by Ron Rosier at Georgetown University with funding from the Sony America Corporation) as the first Freshman Honors Seminar in Mathematics at UNL. I taught it for the first time in Fall 1999. At the conclusion of the Fall 1999 semester, I compiled the course notes into a book which was distributed to the students. I taught the course again in Fall 2000, Fall 2001 and Fall 2006, each time preparing a new book for the students.

Courses Taught at UNL

Analytic Geometry and Calculus I; Math 106

Honors: Analytic Geometry and Calculus II; Math 107H

The Joy of Numbers – Stalking the Big Primes; Math 189H

Contemporary Mathematics; Math 203

Analytic Geometry and Calculus III; Math 208

Introduction to Modern Algebra; Math 310

Matrix Theory; Math 314

Number Theory for Elementary and Middle School Teachers; Math 398

Introduction to Modern Algebra I; Math 417

Introduction to Number Theory; Math 445

Combinatorics; Math 450

Graph Theory; Math 452

Number Theory for (in-service) Middle-level and High School Teachers; Math 806T

Introduction to Modern Algebra I; Math 417/817

Introduction to Modern Algebra I; Math 817

Introduction to Modern Algebra II; Math 818

Introduction to Coding Theory; Math 896

Commutative Algebra; Math 905

Field Theory; Math 907

Topics in Algebra: Mathematical Aspects of Modern Coding Theory; Math 918

Seminar in Number Theory (Intro to Coding Theory); Math 949

Service Activities

Service to the UNL Department of Mathematics

Department Chair, 2012–.

Graduate Committee Chair, 2008-2011.

Coding Theory/Combinatorics Search Committee
Chair, 2006-2007.

Nebraska Mentoring through Critical Transition Points

Program Director, 2004-2009; Steering Committee, 2009-present.

ALL GIRLS/ALL MATH

Co-founder, co-organizer, 1997-2005.

Nebraska Conference for Undergraduate Women in Mathematics

Co-founder, co-organizer, 1998-2011.

Algebra and Discrete Math Search Committee

Committee member, 2003-2004.

Department of Mathematics Teaching Advisory Committee

Committee member, 2003-2008.

Carnegie Initiative on the Doctorate Leadership Team

Team member, 2003.

Department of Mathematics and Statistics Chair Search Committee

Committee member, 2002-2003.

Graduate Recruiting Weekend

Presenter, 2000, 2006, 2007.

Regional Workshop in Mathematics Organizing Committee

Committee member, 1998-1999.

Department of Mathematics and Statistics Executive Committee

Elected member, 1999-2001.

Undergraduate Advisory Committee

Committee member, 1998-2003.

Department of Mathematics and Statistics Search Committee

Committee member, 1997-1998.

Service to UNL

Dean's Award for Excellence in Graduate Education Selection Committee

Appointed Member, 2010.

College of Arts & Sciences Executive Committee

Elected member, 2008-2010.

UNL ADVANCE Internal Advisory Board

2008-present.

College of Arts and Sciences Subcommittee on Distribution Requirements

I served on this subcommittee that was charged with re-designing the College Distribution Requirements in light of the new campus-wide ACE Requirements, Spring 2008.

Office of Graduate Studies New Graduate Student Orientation

I gave some remarks at this event on August 18, 2006.

College of Arts and Sciences Honors Convocation Keynote Speaker

I gave a talk titled "It's not just about numbers" at this event on April 21, 2006.

UNL Summer Research Program Presenter

I gave a 2-hour presentation titled "Graduate Student Expectations" to undergraduate first generation, low income, and minority students in UNL's Summer Research Program on June 18, 2004. I also gave a 2-hour presentation titled "Expectations, Workloads and Responsibilities of Graduate Students" for this program on June 30, 2003.

College of Arts and Sciences Dean's Ambassadors

I was a "Dean's Ambassador" for the 2002-2003 academic year, which meant that I gave advice on recruiting issues and participated in a few recruiting events.

Teachers College Dean Search Committee

I served on the committee to select a new Dean of Teachers College during 2002. The search was aborted when Teachers College and the College of Human Resources and Family Sciences merged to become the College of Education and Human Sciences.

Honors Scholarship Reception Keynote Speaker

I gave a talk to high school students who had been awarded Honors Scholarships at this recruiting event on March 10, 2002.

UNL Research Advisory Board

I served on the Vice Chancellor for Research’s advisory board for five years (2001-2006).

Summer Reading Program Discussion Leader

I led discussions on the book chosen for the summer reading program for incoming students in 2000 and 2001.

Nebraska Distinguished Scholars Day Presenter

I gave a mini-lecture for this recruiting event in 1999 and again in 2006.

Omaha World Herald Dinner Table Host

I spoke with prospective undergraduate students and their parents at this recruiting event in 1999 and 2001.

UNL Faculty Retreat Participant

I attended this event at the invitation of (then-)SVCAA Richard Edwards on October 14-16, 1999.

“Take a Parent to Lunch” Faculty Host

I spoke with faculty of incoming freshmen during UNL New Student Enrollment in 1999, 2000, 2001 and 2006.

Service to the Profession

MAA Committee on George Pólya Lecturers

Appointed Member, 2012-2016.

AMS Centennial Fellowship Committee

Appointed Member, 2010-2012.

Technical Program Committee for the 2010 Information Theory Workshop

2010.

AWM Committee on Committees

Appointed Member, 2009-2012.

MAA Ad Hoc Program Committee for the 2010 Joint Mathematics Meetings

Appointed member, 2008.

MAA Committee on Haimo Awards for Distinguished College or University Teaching of Mathematics

Appointed member, 2007-2010.

MAA Committee on the James R.C. Leitzel Lecture

Appointed member, 2007-2010.

Center for Undergraduate Research in Mathematics

Advisory Board Member, 2006-present.

This Center is based at Brigham Young University, funded by an MCTP grant.

AMS Council

Elected Member at Large, 2006-2009.

AMS Committee on Science Policy

Appointed member as Council representative, 2006-2009.

AMS ICM06 Travel Grant Selection Committee

Appointed member on committee to award travel grants to attend the 2006 ICM, 2005.

AMS-MAA-SIAM Committee on the Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student

Appointed AMS representative, 2005-2008.

AWM Workshop Organizing Committee

This committee of three is charged with organizing the AWM Workshop at the Joint Mathematics Meetings. 2004-2006.

AWM Executive Committee

Elected member, 2002-2004.

Project NExT Consultant

2001-2003, 2010-2011.

AMS Arnold Ross Lecture Series Committee

This committee is charged with selecting speakers for these lectures aimed at high school students. 2001-2004.

Advances in Mathematics of Communications

Editorial Board Member, 2006-present.

Journal of Pure and Applied Algebra

Editor, 2001-2010.

Rose-Hulman Undergraduate Mathematics Journal

Editorial Board Member, 1999-present.

Referee

Advances in the Mathematics of Communications
American Mathematical Monthly
American Mathematical Society (book)
Applicable Algebra in Engineering, Communication and Computing
Communications in Algebra
Contemporary Mathematics
Designs, Codes and Cryptography
IEEE Transactions in Information Theory
IEEE International Symposium on Information Theory
Journal of Algebra
Journal of Algebra and its Applications
Journal of Combinatorial Theory (Series A)
Journal of Pure and Applied Algebra
Proceedings of the American Mathematical Society
Rocky Mountain Journal of Mathematics
SIAM Journal on Discrete Mathematics

Grant Reviewer; National Science Foundation (mail reviews and panels) and National Security Agency (mail reviews).