

Deanna Dreher

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Education

- Ph.D. **University of Nebraska**, Lincoln NE; May 2010 (expected)
Major in Mathematics; Minor in Electrical Engineering
Thesis: *Pseudocodewords on Graph Covers and Computation Trees*
Advisor: Professor Judy L. Walker
- M.S. **University of Nebraska**, Lincoln NE; December 2005
Mathematics
- B.S. **University of Northern Colorado**, Greeley CO; May 2004
Mathematics, Summa Cum Laude

Employment

Graduate Teaching Assistant for the Department of Mathematics, University of Nebraska, Lincoln, 2004-Present

My duties have included full teaching responsibilities for several undergraduate mathematics courses and tutoring at a campus mathematics resource center.

Graduate Mathematics Program at the National Security Agency, Summer 2007

I worked as an applied research mathematician developing new methods and techniques applicable to a large scale collection and data mining problem, briefing other NSA employees and co-authoring a classified paper.

National Oceanic and Atmospheric Administration, 2001-2002

2002: I analyzed chemical spectroscopy of atmospheric compounds. I also aided physical scientists in creating standard flasks.

2001: I assisted Administration in Financial Operations.

Awards

Presidential Fellowship

This University of Nebraska fellowship covers a single academic year and was awarded to four doctoral students at UNL in the last year of their programs during the 2009-2010 academic year.

GAANN Traineeship

This fellowship covers a single academic year (including summer), and is funded by the UNL Mathematics Department's *USDoE Graduate Assistance in Areas of National Need* grant. I was awarded this fellowship in both the 2006-2007 and 2007-2008 academic years.

Outstanding First Year Student Award

I was the sole recipient of this UNL Mathematics Department Award, which was awarded in December 2005 for the 2004-2005 academic year.

MCTP Traineeship

This fellowship was awarded to three first year students for the 2004-2005 academic year (including summer), and was funded by the UNL Mathematics Department's *NSF Mentoring through Critical Transition Points* grant.

Putnam Examination

I tied for second place in the state of Colorado on the December 2003 exam.

Publications

Analysis of connections between pseudocodewords; (with N. Axvig, K. Morrison, E. Psota, L. C. Pérez and J. L. Walker), **Information Theory, IEEE Transactions on**, 55(9):4099-4107, September 2009.

Connections between computation trees and graph covers; (with J. L. Walker), **2009 Information Theory and Applications Workshop, 2009**, pages 360-364, February 2009.

Towards universal cover decoding; (with N. Axvig, K. Morrison, E. Psota, L. C. Pérez and J. L. Walker), **Information Theory and its Applications, 2008. ISITA 2008. International Symposium on**, pages 1-6, December 2008.

Average min-sum decoding of LDPC codes; (with N. Axvig, K. Morrison, E. Psota, L. C. Pérez and J. L. Walker), **Turbo Codes and Related Topics, 2008 5th International Symposium on**, pages 356-361, September 2008.

Towards a universal theory of decoding and pseudocodewords; (with N. Axvig, K. Morrison, E. Psota, L. C. Pérez and J. L. Walker), SGER Technical Report 0801, University of Nebraska – Lincoln, March 2008. Available online at <http://www.math.unl.edu/~jwalker>

A universal theory of pseudocodewords; (with N. Axvig, E. Price, E. Psota, L. C. Pérez and J. L. Walker), **Proceedings of the 45th Annual Allerton Conference in Communication, Control and Computing**, October 2007.

Research Activities

Summer School on Computational Number Theory and Applications to Cryptography, 2006

This was an introduction to the theory and applications of computational number theory and its consequences for cryptography at the University of Wyoming. Its purpose was to bring student participants up to speed on the most recent developments in mathematical cryptography.

Intensive Mathematics: a Mentoring, Education, and Research Summer Experience, 2004-2005
IMMERSE bridges the gap between undergraduate school and graduate school. Reading research articles is a major focus of this summer experience. I was a participant at UNL during 2004 and a mentor during 2005.

Independent Study

I studied properties of the Leibnitz Harmonic Triangle under Dr. Richard Grassl at the University of Northern Colorado during the 2003-2004 academic year.

East Tennessee State University Research Experience for Undergraduates, 2003

I investigated distributional approximations in genome reconstruction and probabilistic versions of Kneser's conjecture with Dr. Anant Godbole.

Seminar Participation

UNL Discrete Math Seminar, 2008 - present

UNL Graduate Student Seminar, 2005 - present

UNL Joint Mathematics and Electrical Engineering Seminar, 2005-2008

UNL Professional Development Seminar, Spring 2008

UNL Teaching Mathematics Seminar, Fall 2006

UNL Landscape Seminar, Spring 2005

Teaching

Graduate Teaching Assistant

University of Nebraska – Lincoln, 2004-Present

Recitation Instructor

Math 106 (Calculus I)

Instructor of Record

Math 102 (Trigonometry)

Math 103 (College Algebra and Trigonometry)

Math 203 (Contemporary Mathematics)

Instructor for Math in the Middle Institute

I worked with in-service middle-level teachers from across the state of Nebraska. I had experience with designing and teaching a distance education course and a one-week intensive course.

Math 805T (Discrete Math)

Math 807T (Using Mathematics to Understand Our World)

Grader

Math 871 (General Topology)

Service**Math Day**, Volunteer, 2004 - Present

This is an annual scholarship competition for high school students across the state of Nebraska.

Graduate Student Advisory Board, 2006 - 2008

The GSAB serves as a liaison between graduate students and faculty of the UNL Department of Mathematics.

Nebraska Conference for Undergraduate Women in Mathematics, Organizing Committee, 2005 - 2007

This is a weekend conference which gives outstanding undergraduate women from across the country the opportunity to discuss their own research and to meet other women who share their interest in the mathematical sciences. As a member of the organizing committee, I participated in discussions about the format of the conference and helped with organizational details.

All Girls/All Math Summer Camp for High School Girls, Graduate Assistant, 2006

The camp provides a stimulating and supportive environment for girls to develop their mathematical ability and interest while learning about number and coding theory. My duties included supervising 28 high school girls during a one-week long camp and assisting in daily courses.

Nebraska IMMERSE, Graduate Student Mentor, Summer 2005

I mentored students during their summer prior to entering graduate school. In addition to helping them with course material, I also advised them on courses to take, teaching and transitioning to graduate school in general.

Talks and Presentations*How to read papers and give [good] presentations*

I was a panelist for this discussion in a UNL graduate course called *Getting started with mathematical literature* (July 2009).

Pseudocodewords of Tanner graphs and trellises

I was invited to give this talk during a special session on Recent Trends in Coding Theory at the Joint Mathematics Meetings (January 2009, Washington, D.C.).

Voting Mathematics

I gave this presentation about election methods and chaotic outcomes during the Graduate Student Seminar at UNL (November 2008).

Pseudocodewords of LDPC codes from voltage graphs

I was invited to give this talk during a special session on Algebraic Aspects of Coding Theory at the AMS spring sectional meeting (April 2008, Bloomington, IN).

Surviving Graduate School

I was a panelist for the Landscape Seminar at UNL (February 2008).

Universal Cover Decoding

I gave this presentation, based on joint work between members of the Mathematics and Electrical Engineering departments, at the Oberwolfach workshop on Coding theory (December 2007).

Zeta Functions of Finite Graphs and Coverings

I gave this series of three talks, based on the papers of the same name by H. Stark and A. Terras, in the Discrete Math Seminar at UNL (Fall 2007).

Finishing Touches to Increase Your (Math) Appeal: Research Opportunities, Internships and More

I was a panelist for this discussion at the Pikes Peak Regional Undergraduate Mathematics Conference (February 2006, Pueblo, CO).

Distributional Approximations in Genome Reconstruction

I gave this presentation, which was based on my work from the ETSU REU, three times:

- 20 minute talk at the Fourth Joint University of Tennessee, Knoxville – East Tennessee State University Undergraduate Research Symposium (July 2003, Knoxville, TN)
- Poster Presentation at the Joint Mathematics Meetings of the AMS/MAA (January 2004, Phoenix, AZ)
- 15 minute talk at the Nebraska Conference for Undergraduate Women in Mathematics (February 2004, Lincoln, NE)

Random Kneser Pairs

I gave this 15 minute talk, which is also based on my work from the ETSU REU, at the Joint Mathematics Meetings of the AMS/MAA (January 2004, Phoenix, AZ). (Note that the program lists my collaborator Alexa Mater as presenting this talk. She was unable to attend the conference and so I filled in for her.)

Leibnitz Harmonic Triangle

I gave this 15 minute talk, based on my independent study, at the MAA Rocky Mountain Section Annual Spring Meeting (April 2003, US Air Force Academy, CO).

Other Conferences Attended*Joint Mathematics Meetings*

January 2008, San Diego, CA
 January 2007, New Orleans, LA
 January 2006, San Antonio, TX
 January 2005, Atlanta, GA

Information Theory and Applications Workshop, February 2009, San Diego, CA

The Canadian Summer School on Communications and Information Theory, August 2008, Banff, Canada

45th Allerton Conference on Communication, Control, and Computing, September 2007, Monticello, IL

PIMS Sequences and Codes conference, July 2006, Toronto, Canada

MathFest, August 2005, Albuquerque, NM

Computer Skills

C	Maple
C++	Mathematica
Matlab	HTML

Teaching References

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Research References

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