Dana C. Ernst

Curriculum Vitae

Contact Information

Mathematics Department
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Research Interests

General

Primary research interests are in the interplay between combinatorics and algebraic structures (MSC 20, 06, 16); undergraduate mathematics education.

Specific

Combinatorics of Coxeter groups and their associated Hecke algebras, Kazhdan–Lusztig theory, generalized Temperley–Lieb algebras, diagram algebras, heaps of pieces; inquiry-based learning (IBL).

Education

University of Colorado, Boulder, CO
PhD, Mathematics, Advisor: Dr. R.M. Green — Aug 2008
Thesis: *A diagrammatic representation of an affine C Temperley–Lieb algebra*

Northern Arizona University, Flagstaff, AZ
MS, Mathematics, Advisor: Dr. M. Falk — May 2000
Thesis: *Cell complexes for arrangements with group actions*

George Mason University, Fairfax, VA
BS, Mathematics — May 1997

Academic Positions

Plymouth State University, Plymouth, NH
Assistant Professor, Mathematics Department — Aug 2008–Present

University of Colorado, Boulder, CO
Graduate Teaching Instructor, Department of Mathematics — Aug 2003–May 2008
Lead Graduate Teacher, Graduate Teacher Program — Aug 2006–May 2007

Front Range Community College, Boulder, CO
Full-time Faculty, Department of Mathematics — Aug 2001–May 2003

Northern Arizona University, Flagstaff, AZ
Instructor, Mathematics & Statistics Department — Jun 2000–May 2001
Graduate Assistant, North Learning Assistance Center — Jan 2000–May 2000
Graduate Teaching Instructor, Mathematics & Statistics Department — Jan 1998–Dec 1999
Graduate Assistant, South Learning Assistance Center — Aug 1997–Dec 1997

Teaching Experience

Summary

15 years of teaching experience at 4 different colleges; recipient of several teaching awards.

Courses Taught

Real Analysis, Abstract Algebra, Visual Group Theory, Number Theory, Linear Algebra, Introduction to Proof, Introduction to Formal Mathematics, Calculus III, Calculus II, Calculus I, Precalculus, Trigonometry, College Algebra, Survey of Algebra, Finite Math, Quantitative Reasoning, College Math with Applications, Mathematics for Elementary School Teachers I, Math Teacher Training (1 credit pedagogy class for graduate students).

Papers

Publications

D.C. Ernst. Diagram calculus for a type affine C Temperley–Lieb algebra, I. *J. Pure Appl. Alg.* (to appear), 2012. [arXiv:0910.0925]

T. Boothby, J. Burkert, M. Eichwald, D.C. Ernst, R.M. Green, and M. Macauley. On the Cyclically Fully Commutative Elements of Coxeter Groups. *J. Algebraic Combin.* (to appear), 2011.

D.C. Ernst. Non-cancellable elements in type affine C Coxeter groups, *Int. Electron. J. Algebra*, 8:191-218, 2010.

Submitted/Preprints

D.C. Ernst and A. Hodge. Within epsilon of independence: An attempt to produce independent proof-writers via an IBL approach in a real analysis course.

D.C. Ernst. Diagram calculus for a type affine C Temperley–Lieb algebra, II. [arXiv:1101.4215]

In preparation

J. Cormier, D.C. Ernst, Z. Goldenberg, J. Kelly, and C. Malbon. T-avoiding elements in Coxeter groups of type A and B.

D.C. Ernst, A. Hodge, A. Schultz. Collaborative peer review between two IBL number theory courses.

Undergrad Research

Exploration of T-avoiding elements in Coxeter groups of type F Fall 2011–Spring 2012
Currently mentoring Ryan Cross, Katie Hills-Kimball, and Christie Quaranta on an original research project aimed at exploring the "T-avoiding" elements in Coxeter groups of type F. Students will present findings during at least one conference.

T-avoiding permutations in Coxeter groups of types A and B Fall 2010–Spring 2011
Mentored Joseph Cormier, Zachariah Goldenberg, Jessica Kelly, and Christopher Malbon on an original research project involving the classification of the "T-avoiding" permutations in Coxeter groups of types A and B. Students presented results at 2011 Hudson River Undergraduate Mathematics Conference, 2011 AMS Spring Eastern Sectional Meeting, and Undergraduate Student Poster Session at 2012 JMM. Article presenting results is in preparation.

Counting generators in Temperley–Lieb algebras of types A and B Spring 2010
Mentored Sarah Otis and Leal Rivanis on an original research project involving Temperley–Lieb algebras of types A and B. Students presented results at 2010 Hudson River Undergraduate Mathematics Conference.

Grant Activity

IBL course materials for group theory (awarded $2500) Summer 2012
Academy of Inquiry-Based Learning. Awarded Category 2 Small Grant to fund development of course materials for an IBL abstract algebra course that emphasizes visualization and incorporates technology.

Conjugacy and reducibility in Coxeter groups (unfunded) Fall 2010
NSF-DMS: Number Theory, Algebra, and Combinatorics. Requested funds to support summer research and travel for PIs and full-year support for undergraduate research assistants. Joint with R.M. Green (University of Colorado) and M. Macauley (Clemson University).

Combinatorics of the CFC-finite Coxeter groups (unfunded) Spring 2010
Center for Undergraduate Research in Mathematics. Requested funds to support two undergraduate students to conduct research for academic year.

The conjugacy problem for Coxeter groups (unfunded) Fall 2009
NSF-DMS: Number Theory, Algebra, and Combinatorics. Requested funds to support summer research and travel for PIs and full-year support for undergraduate research assistants. Joint with R.M. Green (University of Colorado) and M. Macauley (Clemson University).

Honors & Awards

National

Project NExT Fellow Fall 2008–Spring 2009
MAA professional development and mentoring program for new PhDs in mathematics.

Plymouth State University, Plymouth, NH
Distinguished Professor of Mathematics May 2009 & 2011
Teaching award determined by mathematics majors at PSU.

University of Colorado, Boulder, CO
Graduate Part-Time Instructor Teaching Excellence Award Spring 2008
University-wide award given to outstanding graduate teaching instructors.

Burton W. Jones Teaching Excellence Award May 2007
Recognizes outstanding accomplishments in teaching.

Thron Fellowship Summer 2007
Financial award to support summer research, given to most outstanding graduate student.

Best Should Teach Award Fall 2006
Awarded to outstanding Lead Graduate Teachers.

Honorable Mention for Burton W. Jones Teaching Excellence Award May 2006
Recognizes outstanding accomplishments in teaching.

Mathematics Department Summer Fellowship Summer 2006
Financial award to support summer research.

Residence Life Academic Teaching Award Dec 2003
Awarded to instructors based on nominations from students.

Front Range Community College
Finalist for Master Teacher Award May 2002 & 2003
Awarded to instructors based on nominations from students.

George Mason University, Fairfax, VA
Mary K. Cabell Award May 1997
Awarded to the most outstanding graduating mathematics major.

Talks

The Futurama Theorem and Other Mind Swapping Adventures Feb 2012
Math Teachers' Circle at University of Nebraska at Omaha, Omaha, NE

The Futurama Theorem Feb 2012
UNO Mathematics Colloquium, University of Nebraska at Omaha, Omaha, NE

Collaborative peer review between two IBL number theory courses Jan 2012
Scholarship of Teaching and Learning in Collegiate Mathematics, JMM 2012, Boston, MA

The Futurama Theorem Dec 2011
PSU Mathematics Seminar, Plymouth State University, Plymouth, NH

What can you do with a degree in mathematics? Nov 2011
PSU Mathematics Association Panel Discussion, Plymouth State University, Plymouth, NH

The prisoner of Benda and the Futurama Theorem Nov 2011
Mathematics Forum, Gordon College, Wenham, MA

Diagram algebras as combinatorial tools for exploring Kazhdan–Lusztig theory Oct 2011
Dartmouth Combinatorics Seminar, Dartmouth College, Hanover, NH

Mendeley: Reference manager meets social networking Aug 2011
PSU Faculty Workshop Days, Plymouth State University, Plymouth, NH

Mendeley: Reference manager meets social networking Mar 2011
Spotlight on Faculty Using Technology, Plymouth State University, Plymouth, NH

Diagram algebras and applications to Kazhdan–Lusztig theory Mar 2011
CU Algebraic Lie Theory Seminar, University of Colorado at Boulder, Boulder, CO

Within ϵ of independence: An attempt to produce independent proof-writers via an IBL approach in a real analysis course Jan 2011
Getting Students Involved in Writing Proofs, JMM 2011, New Orleans, LA

Technology Sampler Aug 2010
Issues for Early Career Mathematicians in Academia, MathFest 2010, Pittsburgh, PA

On an open problem of the symmetric group Apr 2010
PSU Mathematics Seminar, Plymouth State University, Plymouth, NH

A diagrammatic representation of the Temperley–Lieb algebra Apr 2010
Hudson River Undergraduate Mathematics Conference, Keene State College, Keene, NH

Using wikis to enhance collaboration Apr 2010
Spotlight on Faculty Using Technology 2010, Plymouth State University, Plymouth, NH

On the cyclically fully commutative elements of Coxeter groups Jan 2010
AMS Session on Discrete Mathematics, JMM 2010, San Francisco, CA

On an open problem of the symmetric group Feb 2009
KSC Mathematics Seminar, Keene State College, Keene, NH

A diagrammatic representation of an affine C Temperley–Lieb algebra Jan 2009
MAA Project NExT-YMN Poster Session, JMM 2009, Washington, DC

Diagram calculus for the Temperley–Lieb algebra Nov 2008
MAA Northeastern Section Meeting, Bentley University, Waltham, MA

Diagram algebras and Kazhdan–Lusztig polynomials Jan 2008
Mathematics & Statistics Seminar, Northern Arizona University, Flagstaff, AZ

Weak star reducibility in Coxeter groups Nov 2007
Algebraic Lie Theory Seminar, University of Colorado, Boulder, CO

Temperley–Lieb algebras of types A and B and their associated diagram algebras Oct 2007
Slow Pitch Colloquium, University of Colorado, Boulder, CO

Diagram calculus for the Temperley–Lieb algebra Apr 2007
Graduate Student Combinatorics Conference, University of Washington, Seattle, WA

10 Things I Wish I Would Have Known Before I Started Teaching Nov 2006
Graduate Teacher Program, University of Colorado, Boulder, CO

Introduction to finite reflection groups Oct 2006
Coxeter Groups Seminar, University of Colorado, Boulder, CO

Diagram calculus for the Temperley–Lieb algebra Oct 2006
Slow Pitch Colloquium, University of Colorado, Boulder, CO

Classification of the FC-finite Coxeter groups Oct 2006
Slow Pitch Colloquium, University of Colorado, Boulder, CO

Cell complexes for arrangements with group actions May 2000
Mathematics & Statistics Seminar, Northern Arizona University, Flagstaff, AZ

A cell complex for configuration space Apr 2000
MAA Southwest Section Meeting, Arizona State University, Tempe, AZ

Service to Profession

Co-organizer, MAA Contributed Paper Session on IBL Practices Spring–Summer 2012
MathFest 2012, University of Wisconsin, Madison, WI

Co-organizer, Legacy of R.L. Moore Conference Spring–Summer 2012
Help organize sessions and logistics.

Participant, Project NExT funding video by MAA Jan 2012
Interviewed about impact of Project NExT on my career.

Judge, Undergraduate Student Poster Session Jan 2012
Volunteered as judge for undergraduate poster session at 2012 JMM.

IBL Mentor, Academy of Inquiry-Based Learning Fall 2011–Present
Mentor for small cohort of mathematics instructors in Northeast that are new to IBL.

Co-organizer, AMS Special Session on Combinatorics of Coxeter groups Spring 2011
AMS Spring Eastern Sectional Meeting, College of the Holy Cross, Worcester, MA

Social media volunteer, `@IBLMath` on Twitter Jan 2011–Present
Use social media to increase awareness of inquiry-based learning in mathematics.

Mendeley Advisor Spring 2011–Present
Mendeley is a citation manager that allows scholars to manage, annotate, and share library.

Contributor, Sage Summer 2010–Present
Sage is an open-source alternative to Maple, Mathematica, and Matlab.

List Moderator, 2008-2009 Project NExT Listserve Fall 2009–Present
Manage users (NExT fellows and consultants) and bounced messages.

Other Selected Service

Plymouth State University, Plymouth, NH
Organizer, PSU Mathematics Seminars Spring 2009–Present
Member, Academic Technology Committee Fall 2011–Present
Chair, Online/Blended Learning in Mathematics Policy Committee Fall 2011–Spring 2012
Member, Learning Technology Online Education Director Hiring Committee Fall 2011

Member, Academic Technology Advisory Group	Fall 2010–Spring 2011
Member, Contract Faculty Hiring Committee	Summer 2010
Advisor, PSU Cycling Club	Spring 2010–Present
Co-organizer, 2010 Plymouth Bike/Walk to Work Day	Spring 2010
Coauthor, PSU Carbon Action Plan	Spring 2010
Member, Wellness Works Committee	Fall 2009–Present
Co-organizer, New Faculty Orientation	Summer 2009
Member, President's Commission on Environmental Sustainability	Spring 2009–Fall 2011
Member, Mathematics Curriculum Committee	Spring 2009

University of Colorado, Boulder, CO

Co-organizer, Workshop on Inquiry-Driven Learning	Jan–Feb 2007
Co-organizer, Graduate Student Orientation	Summer 2006 & 2007

Front Range Community College, Boulder, CO

Advisor, STEM Club	Oct 2002–May 2003
Co-organizer, π Day	Jan 2002–Mar 2002
Co-organizer, FRCC Fun Run	Jan 2002–Mar 2002

Northern Arizona University, Flagstaff, AZ

Co-organizer, Yavapai County Math Contest	Jan 2001–Dec 2001
Co-organizer, High School Math Day	Nov 2000 & 1999
Faculty Advisor, NAU Cycling Club	Aug 2000–May 2001
Member, GTA Training Committee	Aug 2000–May 2001
Member, Lecturer Hiring Committee	Oct 2000–Apr 2001

Selected Workshops

An Introduction to GeoGebra — Aug 2010
MAA Minicourse at 2010 MathFest, Pittsburgh, PA

2010 Inquiry-Based Learning Workshop — Jul 2010
Austin, TX

Sage: Using Open-Source Mathematics Software with Undergraduates — Summer 2010
2010 MAA PREP online workshop

Sage Education Days 1 — Dec 2009
Clay Mathematics Institute, Cambridge, MA

Themes in the Interface of Representation Theory and Physics — Dec 2006
Centre for Mathematical Sciences, City University, London, UK

Cellular and Diagram Algebras — Apr 2004
University of Oxford, Oxford, UK

Other Skills

Proficient in using Moodle, Sage, Lurch, Group Explorer, GeoGebra, LaTeX, HTML, CSS, Markdown, and Wordpress

Over 30 hours of training in learning styles and teaching techniques

College Reading and Learning Association Tutor Certification

Project Adventure Certified Ropes/Challenge Course Facilitator

Hobbies

Cycling, Nordic skiing, rock climbing, trail running, and hiking