

Erin Mari McNicholas

CONTACT INFORMATION

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RESEARCH INTERESTS

- Spectral Graph Theory
- Cryptography
- Universal Distributions and Random Matrix Theory

EDUCATION

Ph.D. in Applied Mathematics, August 2006

University of Arizona, Tucson, Arizona

- Dissertation Title:

Embedded Tree Structures and Eigenvalue Statistics of Genus Zero One-Face Maps

- Advisor: Professor Hermann Flaschka

M.S. in Applied Mathematics, May 2002

University of Arizona, Tucson, Arizona

B.A. in Mathematics and Physics, May 1997

Willamette University, Salem, Oregon

- Minor: Studio Art
- GPA: **4.00**, Graduated Summa Cum Laude

EMPLOYMENT/ PROFESSIONAL HISTORY

Assistant Professor. August 2006 to present
Willamette University, Department of Mathematics

Teaching Assistant. August 2000 to August 2006

University of Arizona, Department of Mathematics and the Interdisciplinary College

Contractor. March 2005 to August 2005

Sandia National Laboratory (Developed entry level cryptography training modules)

Metrologist, and Member of the National Metrology Subcommittee on ISO17025 Compliance. August 1998 to August 2000

National Institute of Standards and Technology, and the Oregon Department of Agriculture

Writer/Lobbyist. June 1998 to August 1998

The American Physical Society Internship Program, Public Relations DC Office

GRANTS AND
AWARDS

- Hewlett Grant (with Prof. I. Johnson), 2011-2012
Examining 100-Level Mathematics Course Offerings: Incorporating High Impact Pedagogy and Experiential Learning
- Atkinson Faculty Development Award, 2011
- Lilly Grant (with Prof. H. Cheng), 2010-2012
Promoting New Areas of Research and Interdisciplinary Learning in Computer Science and Mathematics
- Hewlett Grant Recipient, 2008-2009
The Mathematics Colloquium Series: Bridging the Gap Between Course Work, Research, and Application
- Junior Faculty Research Leave Award, Spring 2009
- Atkinson Faculty Development Award, 2007
- National Project NExT Fellow, (Sepia Dot) 2006-2007
- Junior Oberwolfach Fellow, Mathematisches Forschungsinstitut
Oberwolfach Seminar: Arithmetic Geometry and Public Key Cryptography, Organizers: Gerhard Frey and Tanja Lange
- National Science Foundation VIGRE Grant, University of Arizona (3 semesters)
- Applied Mathematics Fellowship, University of Arizona
- Willamette University Departmental Honors (Mathematics)
- Chester F. Luther (Mathematics) Scholarship
- Robert L. Purbrick (Physics) Scholarship
- Alpha Lambda Delta Book Award

TEACHING
AWARDS

Parent and Family Weekend Mini-University Professor
Student Activities Office, Willamette University, Fall 2011

Outstanding Graduate Teaching Assistant Award
College of Science, University of Arizona, Spring 2004

Eller Business and Public Administration Student Council Award for Teaching
University of Arizona, Fall 2002

TEACHING
EXPERIENCE**Willamette University, Department of Mathematics**

- Mathematics Courses Taught:
 - one section of Cryptology Senior Seminar (MATH 499W)
 - one section of Independent Study, Operations Research (MATH 490)
 - two sections of Modern Algebra II (MATH 457 (formerly 486))
 - one section of Modern Algebra (MATH 456)
 - three sections of Linear Algebra (MATH 253)
 - five sections of Foundations of Advanced Mathematics (MATH 251W)
 - two sections of Multivariable Calculus (MATH 249)
 - one section of Calculus II (MATH 142)
 - two sections of Calculus I (MATH 141)
 - four sections of Statistics (MATH 138)
 - two sections of Contemporary Mathematics (MATH 130)
- Interdisciplinary Courses Taught:
 - one section of College Colloquium: Math as Metaphor (IDS 101)

University of Arizona, Department of Mathematics and the Interdisciplinary College

- Primary instructor for:
 - one section of Math in Modern Society (MATH 105)
 - two sections of College Algebra (MATH 110)
 - two sections of Trigonometry (MATH 111)

three sections of Business Mathematics I (MATH 115A)
 one section of Business Mathematics II (MATH 115B)
 one section of Understanding Elementary Mathematics (MATH 302A)

- Member of the Teaching Team for the general education course, Introduction to Global Climate Change
- Curriculum Development Teaching Assistant. Worked with Prof. Hirschboeck to improve the curriculum of NATS 101: Introduction to Global Climate Change.
- Lead recitation sections for the graduate core analysis course, Principles of Analysis, and assisted Prof. Kim in the teaching of Math 263: Biostatistics

PUBLICATIONS

“A Note on the Binomial Structure of Vertex Adjacencies in Random Planar Trees.”

- In preparation

“Generalizing Bar k -Visibility Graphs” (with T. Brounstein, I. Johnson, L. Maloney, A. Mosher, R. Zyskowski).

- In preparation

“Graph Invertibility” (with C. McLeman).

- Submitted for publication and under review

“Eigenvalue Statistics of One-Face Maps.”

- To appear in *Congressus Numerantium*, Vol. 207-211

“Spectra of Coronae” (with C. McLeman).

- *Linear Algebra and Its Applications* **435**(5) (2011) pp. 998-1007

UNDERGRADUATE
RESEARCH
PROJECTS

Generalizing Bar k -Visibility Graphs,
 2009 Willamette Valley REU-RET Consortium for Mathematics Research

Deterministic Generation of Given Genus Sample Sets in Three-Regular Graph Representations of One-Face Maps,
 2007 Presidential Scholar Greg Henselman

ADDITIONAL
RESEARCH
EXPERIENCE

Sandia Summer Internship Program, Summer 2002, 2003 and 2004
 Sandia National Laboratory, Albuquerque, NM.

- Under the direction of Dr. Cheryl Beaver, studied secure mobile coding and elliptic curve factorization. Wrote C code to implement an elliptic curve factorization scheme and a weak key attack on the Blowfish cipher

Research Tutorial Group, Spring 2001
 Department of Mathematics, University of Arizona.

- Under the direction of Dr. Minhyong Kim, studied group representations of compact Lie Groups and their application to the symmetries of the Hydrogen atom

Particle Physics Research Assistant, Summer 1997
 CLEO Collaboration, University of Rochester,
 Wilson Synchrotron Laboratory, Cornell University, Ithaca, NY.

- Studied the production of pi-mesons, writing FORTRAN code which searched synchrotron data for events with evidence of pi-meson production and analyzed various aspects of these events

Murdock Grant Recipient, Summer 1996

Willamette University, Physics Department, Salem, Oregon.

- Conducted research on $Yb_{a_2}Cu_3O_{7-d}$ thin film superconductors, determining the type and degree of crystal alignment using an x-ray diffractometer

Carleton/St. Olaf Summer Mathematics Program, Summer 1995

The National Science Foundation and the National Security Agency

- Studied Dynamical Systems and Knot Theory

INVITED TALKS

- Carleton College, SMPosium, Northfield, Minnesota, July 1, 2011
- *Graph Invertibility*
- Western Oregon University, Monmouth, Oregon, May 19, 2011
- *The Rubik's Cube Group*
- Oregon State University, REU Seminar, Corvallis, Oregon, August 4, 2010
- *The Rubik's Cube Group*
- MAA Mathfest, Portland, Oregon, August 6, 2009
Invited Paper Session, Discrete Mathematics
- *Vertex Adjacencies in Random Planar Trees*
- Pacific University Mathematics Colloquium, Forrest Grove, Oregon, April 30, 2009
- *Universal Distributions*
- Oregon State University Mathematics Colloquium, Corvallis, Oregon, November 9, 2007
- *Embedded Tree Structures of Genus Zero One-Face Maps*
- California State University, REUT Seminar, Chico, California, July 27, 2007
- *From Primes to Riemann to Random Matrices and Graph Theory*
- Carleton College, SMPosium, Northfield, Minnesota, June 29, 2007
- *Symposium Panelist*
- Linfield College Science Colloquium, McMinnville, Oregon, April 19, 2007
- *From Primes to Riemann to Random Matrices and Graph Theory*
- University of Portland Mathematics Colloquium, Portland, Oregon, March 21, 2007
- *Encryption Goes Public*
- Portland Area Lecture Series, Portland State University, Oregon, February 13, 2007
- *Embedded Tree Structures of Genus Zero One-Face Maps*
- Applied Mathematics Seminar, Ohio State University, Columbus, Ohio, January 25, 2007
- *Embedded Tree Structures and Eigenvalue Statistics of Genus Zero One-Face Maps*
- MAA Southwest Sectional Meeting, Tucson, Arizona, April 2006
- *ConcepTests: Implementations & Examples from a Wide Range of Courses*

CONTRIBUTED
TALKS &
PRESENTATIONS

- Southeastern International Conference on Combinatorics, Graph Theory, and Computing, Boca Raton, Florida
 - *Eigenvalue Statistics of One-Face Maps*, Contributed Paper Session, March 7, 2011
- AMS/MAA Joint Mathematics Meetings
 - *Spectra of Coronae*, Discrete Mathematics Contributed Paper Session, January 2010 (San Francisco, CA)
 - *Making the Transition from an Undergraduate Institution to Graduate School*, Young Mathematician's Network Panel, January 2006 (San Antonio, TX)
- Willamette University Faculty Colloquium, Salem, Oregon
 - *Listening to Groups: Campanology & Kinship*, February 2008
- Willamette University Mathematics Colloquium, Salem, Oregon
 - *Applications of Finite Permutation Groups and Their Subgroups*, February 2010
 - *Mathematical Toys: the Rubik's Cube and Other Permutation Puzzles*, December 2007
 - *From Primes to Riemann to Random Matrices and Graph Theory*, November 2006
- Analysis and Its Applications Seminar, University of Arizona
 - *Embedded Tree Structures*, May 2006
 - *Eigenvalue Statistics of Random One-Face Maps*, April 2005
- Los Alamos Days Conference
 - *The Universality of the Eigenvalue Distributions of Random Matrices*, January 2005
- Crypto Meeting, Sandia National Laboratory
 - *Ramanujan Graphs: Random Matrix Models*, July 2004
 - *Counting MDS Codes*, July 2003
- Applied Graduate Colloquium, Department of Mathematics, University of Arizona
 - *The Many Representations of a Genus Zero Map Having One-Face*, October 2005
 - *Ramanujan Graphs and the Cayley Construction*, April 2004
- Graduate Colloquium, Department of Mathematics, University of Arizona
 - *Elliptic Curve and Hyperelliptic Curve Cryptography*, Fall 2004
 - *Elliptic Curves: for the Pure and Impure at Heart*, Fall 2003
- Student Internship Program Symposium, Sandia National Laboratory
 - *Public Key Cryptography*, August 2002
- Applied Research Tutorial Group Colloquium, Department of Mathematics, University of Arizona
 - *Group Representations and the Symmetries of the Hydrogen Atom*, Spring 2001

CONFERENCES,
INSTITUTES, AND
WORKSHOPS
ATTENDED

- Summer Mathematics Program for Women, SMPosium, July 2011
Carleton College, Minnesota
- Association of American Colleges and Universities, Institute on General Education,
June 2011
San Jose State University, California
- 42nd Southeastern International Conference on Combinatorics, Graph Theory, and
Computing, March 2011
Florida Atlantic University, Florida
- MAA PREP course in Algebraic Number Theory, June 2010
Williams College, Massachusetts
- College Colloquium Writing Workshop, May 2010
Willamette University, Oregon
- AMS/MAA Joint Meetings, January 2010
San Francisco, California
- SMP-GEM Workshop, January 2010
San Francisco, California
- MAA Mathfest, August 2009
Portland, Oregon
- MAA Mathfest, August 2007
San Jose, California
- Summer Mathematics Program for Women, SMPosium, June 2007
Carleton College, Minnesota
- MAA Pacific Northwest Sectional Meeting, April 2007
McMinnville, Oregon
- AMS/MAA Joint Meetings, January 2007
New Orleans, Louisiana
- MAA Mathfest, August 2006
Knoxville, Tennessee
- MAA Southwest Sectional Meeting, April 2006
Tucson, Arizona
- AMS/MAA Joint Meetings, January 2006
San Antonio, Texas
- Los Alamos Days Conference, January 2005
University of Arizona
- Oberwolfach Seminar on Arithmetic Geometry and Public Key Cryptography, Novem-
ber 2004
Invited Participant, Organizers: Tanja Lange and Gerhard Frey
Mathematisches Forschungsinstitut Oberwolfach, Germany

Student Internship Program Symposium, August 2002
Sandia National Laboratory, New Mexico

UNIVERSITY
SERVICE

Willamette University

- General Education Working Group (Appointed by the Academic Council), December 2010-present
- Budget Advisory Committee Elected Member, Fall 2009-Spring 2011
- Visiting Instructor Search Committee Member, Mathematics, Spring 2010
- Faculty Chair, Faculty and Staff Campaign Committee, Spring 2010
- Academic Programs Committee Member, August 2007-January 2009
- Tenure-Track Search Committee Member, Mathematics, 2008-2009
- Ford Hall Art Committee Member, 2008-2009
- Faculty and Staff Campaign Committee Member, Spring 2008
- Mathematics Department Newsletter Editor, 2008
- Women in Math, Computer Science, and Physics Group Mentor, 2007-present
- Tenure-Track Search Committee Member, Physics, 2007-2008
- Visiting Instructor Search Committee Member, Mathematics, Spring 2008
- Mathematics Colloquium Organizer, 2006-present
- Math Club Co-Advisor, 2006-2007
- Tenure-Track Search Committee Member, Mathematics, 2006-2007
- Hewlett Grant: Academic Support Services Working Group Member, Summer 2007
- HHMI Working Group Member, Summer 2007

University of Arizona, Department of Mathematics

- Entry Level Committee, Graduate Teaching Assistant Representative, 2005-2006 Academic Year
- Algebra ConcepTests Working Group, Fall 2005
- First Year TA Mentoring, Fall 2005
- Freshman Placement Advising, Summer 2001

COMMUNITY
OUTREACH

Expanding Your Horizons Conference, Origami Session Leader. January 2011
Willamette University

Sonia Kovalevsky Day, Cryptography Workshop Coordinator. Spring 2006
University of Arizona, Department of Mathematics

High School SETI Workshop Coordinator. Spring 2005
University of Arizona, Department of Mathematics

High School Cryptography Workshop Coordinator. Spring 2003 and 2004
University of Arizona, Department of Mathematics

High School Calculus Visits. Spring 2004
University of Arizona, Department of Mathematics

PROFESSIONAL
SERVICE &
MEMBERSHIPS

Reviewer, Chapter Zero: Fundamental Notions of Abstract Mathematics, 2011
Consultant, Lewis & Clark College REU, 2011
SMP-GEM Mentor, 2010
Contributor, Instructor Resources for Algebra: Form and Function, 2008
Undergraduate Research Poster Judge, AMS/MAA Joint Meetings, January 2007
Project NExT Fellow (Sepia)
Member of the American Mathematical Society, the Mathematical Association of America, and the Association for Women in Mathematics