CURRICULUM VITAE

Aaron Abrams
Department of Mathematics and Computer Science
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Education

Ph.D., **University of California, Berkeley**, Mathematics, 2000.

B.S. with highest honors, **University of California, Davis**, Mathematics, 1993.

Positions

Assistant Professor, Department of Mathematics and Computer Science, Emory University, August 2004–present.

Postdoctoral Fellow, Mathematical Sciences Research Institute, August–December 2004.

NSF VIGRE Postdoctoral Fellow, Department of Mathematics, University of Georgia, August 2001–July 2004.

Visiting Research Fellow, Department of Mathematics, University of California, Berkeley, August–December, 2003.

Mathematics Consultant, Ember Corporation, June–August 2002.

Franklin Postdoctoral Fellow, Department of Mathematics, University of Georgia, August 2000–August 2001.

Awards

Research Grant, Emory College Seed Fund, Emory College, 2007–2008.
Course Development Grant, Center for Teaching and Curriculum, Emory College, 2007.
Course Development Grant, Center for Teaching and Curriculum, Emory College, 2006.
Mathematics Department Fellowship, UC Berkeley, 1999.
Outstanding Graduate Student Instructor Award, UC Berkeley, 1995–1996.
Department of Education National Need Fellowship, UC Berkeley, 1993–1994.
Mathematics Department Citation, UC Davis, 1993.

Research Interests

Geometry and Topology: Geometric group theory; configuration spaces; topology of 3-dimensional manifolds; triangulations.

Applications: Geometric and topological methods in robotics; graph theory and networks.

Combinatorics: Probabilistic and topological methods.

Advisee

Praphat Fernandes, Ph.D. student, Emory University, 2007–present.

Publications

"Finding good bets in the lottery, and why you shouldn't take them," with S. Garibaldi, to appear in *American Mathematical Monthly.*

"Optimal estimators for threshold-based quality measures," with S. Ganzell, H. Landau, Z. Landau, J. Pommersheim, and E. Zaslow, submitted for publication.

"Why not buy lottery tickets?" with S. Garibaldi, *The Academic Exchange* (an Emory University publication), vol. 10 no. 4 (2008), pp. 10–11.

"The number of possibilities for random dating," with E. R. Canfield and A. Granville, *Journal of Combinatorial Theory, Series A*, vol. 115 (2008), pp. 1265–1271.

"A million-dollar proof," *The Mathematical Intelligencer,* vol. 29 no. 4 (2007), pg. 8.

"Random multiplication approaches uniform measure in finite groups," with H. Landau, Z. Landau, J. Pommersheim, and E. Zaslow, *Journal of Theoretical Probability,* vol. 20 no. 1 (2007), pp. 107–118.

"Distances of Heegaard splittings," with S. Schleimer, *Geometry & Topology,* vol. 9 (2005), pp. 95–119.

"State complexes for metamorphic systems," with R. Ghrist, *International Journal of Robotics Research,* vol. 23 no. 7–8 (2004), pp. 809–824.

"Configuration spaces of colored graphs," *Geometriae Dedicata,* vol. 92 (2002), pp. 185–194.

"Circles minimize most knot energies," with J. Cantarella, J. Fu, M. Ghomi, and R. Howard. *Topology,* vol. 42 no. 2 (2002), pp. 381–394.

"Finding topology in a factory: configuration spaces," with R. Ghrist, *American Mathematical Monthly,* vol. 109 no. 2 (2002), pp. 140–150.

"An iterated random function with Lipschitz number 1," with H. Landau, Z. Landau, J. Pommersheim, and E. Zaslow, *Theory of Probability and its Applications,* vol. 47 no. 2 (2002), pp. 286–300.

"Evasive random walks and the clairvoyant demon," with H. Landau, Z. Landau, J. Pommersheim, and E. Zaslow, *Random Structures & Algorithms,* vol. 20 no. 2 (2002), pp. 239–248.

"Yet another species of forbidden distances chromatic number," with P. Johnson, Jr., *Geombinatorics,* vol. 10 no. 3 (2001), pp. 89–95.

"Configuration spaces and braid groups of graphs," Ph.D. thesis, University of California, Berkeley, 2000.

"Upper chromatic numbers: an update," *Geombinatorics,* vol. 10 no. 1 (2000), pp. 4–11.

"Evasive random walks," in Paul Erdős and his Mathematics (Budapest, 1999), János Bolyai Math. Soc., Budapest, 1999, pp. 1–3.

"The k^{th} upper chromatic number of the line," *Discrete Mathematics,* vol. 169 (1997), pp. 157–162.

"The probability that $(a, b) = 1$," with M. Paris, *College Mathematics Journal,* vol. 23 no. 1 (1992), pg. 47.

Selected Invited Presentations

Research Conferences

Seventh AMS-SMM joint meeting (held at Zacatecas, Mexico), May 2007.
Special session on "Low Dimensional Topology."

AMS-MAA joint national meetings (held at New Orleans, LA), January 2007.
AMS special session on "Arrangements and Related Topics."
Southeast Geometry Conference (held at Georgia Tech), December 2005.
AMS meeting (held at Evanston, IL), October 2004.
Special session on "Mathematical Problems in Robotics."
AMS meeting (held at Albuquerque, NM), October 2004.
Special session on "Braids and knots."
Topology and Robotics (a conference held at ETH Zürich, Switzerland), June 2003.
AMS meeting (held at Baton Rouge, LA), March 2003.
Special session on "Arrangements in Topology and Algebraic Geometry."
AMS-MAA joint national meetings (held at New Orleans, LA), January 2001.
AMS special session on "Braid Groups and Configuration Spaces."
Georgia International Topology Conference, July 2000.
Paul Erdős and his Mathematics (a conference held at the Hungarian Academy of Sciences in Budapest, Hungary), July 1999 (poster session).
AMS-MAA joint meetings (held at Eugene, Oregon), June 1994.
Special session on Undergraduate Research.
AMS-MAA-CMS joint national meetings (held at Vancouver, B. C.), August 1993.
Special session on Undergraduate Research.

Colloquia

Reed College Mathematics Colloquium, October 2008.
Reed College Mathematics Colloquium, April 2006.
Claremont Mathematics Colloquium, February 2005.
Emory University Mathematics Colloquium, February 2004.
University of Oregon Mathematics Colloquium, December 2003.
Emory University Mathematics Colloquium, April 2003.

Research Seminars

Emory University Topology Seminar, several dates 2005–2008.
University of Georgia Geometry Seminar, January 2007.
Georgia Tech Topology Seminar, November 2005.
UC Santa Barbara Topology Seminar, January 2005.
Claremont Topology Seminar, January 2005.
UC Davis Discrete Math Seminar, December 2004.
UC Berkeley Topology Seminar, September 2004.
Mathematical Sciences Research Institute Postdoc Seminar, August 2004.
Columbia University Geometric Topology Seminar, January 2004.
UC Davis Topology Seminar, October 2003.
Mathematical Sciences Research Institute Postdoc Seminar, September 2003.
UC Berkeley Topology Seminar, September 2003.
University of Illinois Computational Topology Seminar, December 2002.
University of Georgia Topology Seminar, various dates 2002–2004.
UGA-Georgia Tech-Emory joint Topology Seminar, several dates 2000–2002.
University of Georgia Geometry Seminar, March–April 2003.
Georgia Tech Combinatorics Seminar, October 2000.
UGA-Georgia Tech-Emory joint Combinatorics and Topology Seminar, December 2000.
UGA CATS (Combinatorics, Algorithms, and Theory Seminar), several dates 2000–2002.
UC Davis Topology Seminar, June 2000.
UC Berkeley Geometric Group Theory Seminar, January 2000.
UC Berkeley Topology Seminar, various dates 1993–2000.
UC Berkeley Hyperbolic Geometry Seminar, November 1997.

Expository lectures

Sonya Kovalevsky High School Mathematics Day, Emory University, April 2008.
Research Focus Group on Geometric Group Theory, UC Davis, June 2007.
Emory University Undergraduate Math Majors Association, September 2007.
Emory Math Club Lecture, Emory University, February 2007.
Emory Math/CS Graduate Student Colloquium, Emory University, November 2005.
University of Georgia VIGRE Seminar, various dates 2001–2007.
Mathematics Advanced Study Semesters Colloquium, Penn State University, October 2003.
Canada/USA Mathcamp Colloquium, University of British Columbia, July 2000.
University of Georgia Math Club Lecture, various dates 2000–2002.
UC Berkeley Mathematics Undergraduate Student Association Lecture, November 1998.
UC Berkeley Graduate Student Colloquium, various dates 1993–2000.
UC Davis Mathematics Awareness Week Lecture, April 1993.

Teaching Experience

Courses taught

Graduate courses:
Geometric Group Theory (Emory, 2008)
Topology (Emory, 2005–2006)
Topics in topology and group theory (UGA, 2002)
Calculus on manifolds (UGA, 2003)
Algebraic topology (UCB, 1999, TA)

Upper division courses:
Combinatorics (UGA, 2002)
Graph theory (UGA, 2002 and 2004)
Number theory (UGA, 2003)
Seminar on low-dimensional topology (UCB, 1997)
Knot theory (Summer Institute for the Mathematical Sciences, 1997, TA)
Real analysis (UCB, 1997, TA, PDP)
Linear algebra (UCB, 1998, TA, PDP)
Abstract algebra (UCB, 1998, TA, PDP)

Lower division courses:
Freshman Seminar: The Shape of Space (Emory, 2007)
Freshman Seminar: Knot Theory (Emory, 2007)
Calculus II (Emory, 2005, 2006, 2007, 2008)
Mathematical Modeling (University of Georgia, 2001)
Precalculus (University of California, Berkeley, 1998)
Differential calculus (UGA, 2000)
Integral calculus (UCB, 1996, TA, Professional Development Program)
Multivariable calculus (UCB, 2000, TA)
Discrete mathematics (UCB, 1995)

High school courses:
Ramsey theory (Hampshire College Summer Studies in Mathematics, 1993)
Group theory (HCSSiM, 1993)
Algebraic number theory (HCSSiM, 1993, TA)
Introduction to Advanced Mathematics (Davis High School, 1992, TA)

Curriculum Development: I have designed and taught topology courses at both the undergraduate level (UC Berkeley and Emory University) and the graduate level (University of Georgia and Emory University). At UC Berkeley this was a seminar-style course for junior and senior mathematics majors. At Emory I have created and taught two freshman

seminars in topology.

At Emory I have also redesigned the fall semester Calculus II course to better accommodate the backgrounds and expectations of the students, who have all earned a high score on an advanced placement exam.

While at UC Berkeley, I designed, created, and published materials for new lower division Linear Algebra and Integral Calculus courses. These courses emphasized group work as integral to the learning process.

Professional and Community Service

MSRI Academic Sponsor's Committee, 2007–present.

Teaching mentor for graduate students, Emory University, 2007–2008.

Strahan Award Committee, University of Georgia, 2003.

Organizer, Georgia International Topology Conference, 2002.

Mathematics consultant for Manitoba Theater Company's production of David Auburn's play "Proof," 2002.

Mentor for underrepresented mathematics students, Professional Development Program, UC Berkeley, 1995–1998.

Referee for several journals, 1998–2008.

Assistant Site Coordinator, American Regions Math League, 1995–1999.

Undergraduate Program Committee, Math Department, UC Davis, 1991-1992.