

Aaron Heap
Curriculum Vitae

CONTACT INFORMATION:

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EDUCATION:

Ph.D. Mathematics	Rice University	2004	
B.S. Mathematics	Texas Christian University	1998	(Phi Beta Kappa)

PROFESSIONAL EMPLOYMENT:

2013-Present	SUNY Geneseo	Mathematics	Associate Professor
2007-2013	SUNY Geneseo	Mathematics	Assistant Professor
2004-2007	University of Rochester	Mathematics	Visiting Assistant Professor
1998-2004	Rice University	Mathematics	Teaching and Research Assistant
2001-2002	Rice University	Mathematics	Graduate Instructor

PUBLICATIONS AND REVIEWS:

Journal Articles

On the Andreadakis-Johnson filtration of the automorphism group of a free group (with F. Cohen and A. Pettet), *Journal of Algebra*, Volume 329, Issue 1 (2011).
Bordism invariants of the mapping class group, *Topology* 45, Issue 5 (2006).

Submitted for Publication

Tile Number and Space-Efficient Knot Mosaics (with D. Knowles), Submitted to *Knot Theory and Its Ramifications* (2017).

Web-Based Publications

ProofSpace: A Digital Introduction to Mathematical Proofs (with S. Uttamchandani), <http://www.geneseo.edu/proofspace> (2015).

Textbook Reviews

Differential Equations and Linear Algebra, Third Edition, Goode and Annin, 2013
Calculus, Jeff Holt, 2006.
Calculus, Taalman, Brazfield, and Kohn, 2005.

AWARDS AND HONORS:

2017	Student Athlete Faculty Appreciation Award, SUNY Geneseo (Swimming/Diving)
2013	Phi Eta Sigma Honorary Faculty Inductee, SUNY Geneseo
2013	Student Athlete Faculty Appreciation Award, SUNY Geneseo (Softball)
2013	Student Athlete Faculty Appreciation Award, SUNY Geneseo (Basketball)
2012	Student Athlete Faculty Appreciation Award, SUNY Geneseo (Soccer)

- 2011 SUNY Chancellor's Award for Excellence in Teaching
- 2011 Student Athlete Faculty Appreciation Award, SUNY Geneseo (Tennis)
- 2005 Undergraduate Professor of the Year, University of Rochester
- 2004 Clay Mathematics Institute Liftoff Fellowship

GRANTS AND SUPPORT:

- 2015 Computing & Information Technology Faculty Scholarship, SUNY Geneseo
- 2014-15 Innovative Instruction Technology Grant (IITG), Open SUNY funded, SUNY Geneseo
- 2014 Dean Johnston Student Research Assistantship, Geneseo Foundation, SUNY Geneseo
- 2013 Proposal Writing Support Award, Geneseo Foundation, SUNY Geneseo
- 2013 Faculty Incentive Grant, Geneseo Foundation, SUNY Geneseo
- 2013 Faculty Travel Grant, Geneseo Foundation, SUNY Geneseo
- 2012 Faculty Travel Grant, Geneseo Foundation, SUNY Geneseo
- 2010-13 MAA WeBWorK Consultant Stipend, National Science Foundation funded, SUNY Geneseo
- 2004 Clay Mathematics Institute Liftoff Fellowship, University of Rochester
- 2002-04 Research Assistant, Noncommutative Algebraic Phenomena in the Topology of Three- and Four-Dimensional Spaces, National Science Foundation DMS 0104275, Rice University

INVITED TALKS:

- 2013 *Knot, Knot. Who's There?*, Houghton College, December.
- 2011 *The Mathematics of an Infinite God: A Journey Through Flatland*, Rochester Institute of Technology, September.
- 2010 *The Mathematics of an Infinite God: A Journey Through Flatland*, St. John Fisher College, September.
- 2006 *The Fascinating World of Knots*, SUNY Geneseo, December.
- 2006 *Bordism Invariants of the Mapping Class Group*, Torelli Workshop Chicago, August.
- 2005 *Bordism Invariants of the Mapping Class Group*, University of Chicago, May.
- 2005 *Bordism Invariants of the Mapping Class Group*, University of Buffalo, April.
- 2004 *Bordism Invariants of the Mapping Class Group*, Cornell University, November.
- 2004 *The Fascinating World of Knots*, Trinity University, June.
- 2004 *Bordism Invariants of the Mapping Class Group*, BIRS Workshop, Knots and Their Manifold Stories, Banff, Canada, May.
- 2003 *Bordism Invariants of the Mapping Class Group*, Ohio State University, May.

CONFERENCE ACTIVITY:

Conferences and Workshops Organized:

- 2016 MAA Seaway Section Spring Meeting, SUNY Geneseo (Co-Coordinator), April.
- 2012 *Introduction to WeBWorK*, MAA Seaway Section Fall Meeting, October.
- 2011 *Introduction to WeBWorK*, AMTNYS Annual Fall Conference, October.

Presentations:

- 2015 *A Digital "ProofSpace": Facilitating a Blended Classroom for Mathematical Proofs*, SUNY Conference on Instruction and Technology, May.
- 2015 *ProofSpace: A Flipped Classroom Experience*, AMS/MAA Joint Math Meetings, San Antonio, TX, 2015 (with students John Hines and Cathryn Menarchem).
- 2013 *Understanding the Johnson Filtration of the Mapping Class Group via Geometric Topology*, MAA MathFest 2013, Hartford, CT, August.
- 2004 *Bordism Invariants of the Mapping Class Group*, AMS/MAA Joint Mathematics Meeting, Phoenix, AZ, January.
- 2003 *Bordism Invariants of the Mapping Class Group*, George Washington University, Knots in Washington XV Conference, January.
- 2003 *Bordism Invariants of the Mapping Class Group*, AMS/MAA Joint Mathematics Meeting, Baltimore, MD, January.

Discussant:

- 2010 *Online Homework Systems and Media Resources for Mathematics and Statistics, Focus Group, WH Freeman & Company*, MAA MathFest 2010, Pittsburgh, PA, August.

Workshop Participation:

- 2010 MAA WeBWorK Consultant Workshop, MAA MathFest 2010, Pittsburgh, PA, August.

Other Attendance:

- 2016 Topology in Dimension 3.5, Rice University, Houston, TX, June.
- 2012 WeBWorK Code Camp, University of Rochester, Rochester, NY, June.
- 2011 MAA Seaway Section Spring Meeting, April.
- 2006 Advances in Number Theory and Random Matrix Theory, University of Rochester, June.
- 2006 Texas Geometry and Topology Conference, Rice University, Houston, TX, October.
- 2006 Torelli Workshop in Chicago, August.
- 2005 3-Manifolds and Knot Theory Conference, University of Texas, Austin, May.
- 2005 Braids, links, and mapping class groups, Columbia University, March.
- 2005 Submanifolds, Singular Varieties and Stratified Spaces, Courant Institute, NYU, March.
- 2004 BIRS Workshop, Knots and Their Manifold Stories, Banff, Canada, May.
- 2004 Texas Geometry and Topology Conference, Texas Christian University, February.
- 2003 Texas Geometry and Topology Conference, Rice University, October.
- 2003 Topology of Manifolds of Dimension 3 and 4, University of Texas, Austin, June.
- 2002 Spring Topology and Dynamics Conference, University of Texas, Austin, April.
- 2001 Georgia Topology Conference, University of Georgia, June.
- 2001 AMS/MAA Joint Mathematics Meeting, New Orleans, LA, January.
- 2000 Texas Geometry and Topology Conference, Rice University, October.

Campus Talks:

- 2017 *The Mathematics of an Infinite God: A Journey Through Flatland*, Ratio Christi, SUNY Geneseo, April.
- 2015 *Knots and Soap Films*, Master Teacher Workshop, SUNY Geneseo, September.
- 2015 *The Mathematics of an Infinite God: A Journey Through Flatland*, Ratio Christi, SUNY Geneseo, March
- 2009 *Introduction to WeBWorK*, SUNY Geneseo, December.
- 2004 *Bordism Invariants of the Mapping Class Group*, Topology Seminar, University of Rochester, October.
- 2003 *A Spin Bordism Representation of the Mapping Class Group*, Topology Seminar, Rice University, September.
- 2003 *Introduction to Bordisms, Spin Bordisms, and the Mapping Class Group*, Current Math Seminar, Rice University, September.
- 2002 *MCG and 3-Dimensional Bordisms*, Mathematical Sciences Seminar, Rice University, December.
- 2002 *Bordism Invariants of the Generalized Johnson Subgroup*, Topology Seminar, Rice University, October.
- 2002 *The 3-Dimensional Bordism Groups Relationship to the Johnson Subgroups*, Current Math Seminar, Rice University, September.
- 2001 *Mapping Class Groups and the Generalized Johnson Homomorphism*, Current Math Seminar, Rice University, October.
- 2000 *The Lickorish Twist Theorem*, Current Math Seminar, Rice University, October.
- 1999 *Measuring the Shape of the Universe*, Current Math Seminar, Rice University, November.

TEACHING EXPERIENCE:

SUNY Geneseo

Calculus I, Calculus II, Calculus III, Differential Equations, Linear Algebra I, Linear Algebra II, Honors Linear Algebra, Introduction to Mathematical Proofs, Abstract Algebra, Topology, Low-Dimensional Topology, Algebraic Topology, Introduction to 3D Modeling and Printing, Oral Presentation and Research Seminar

Curriculum/Course/Degree Development: Bachelor of Science in Mathematics, 3D Printing, Mathematical Proofs, Algebraic Topology, Low-Dimensional Topology, Honors Mathematics I, II, and III

University of Rochester

Calculus I, Calculus II, Honors Calculus I, Honors Calculus II, Honors Calculus III (Linear Algebra and Differential Equations), Honors Calculus IV (Multivariable Calculus), Linear Algebra with Differential Equations, Linear Algebra.

Rice University

Instructor: Calculus I, Differential Equations with Linear Algebra

Teaching Assistant: Calculus I, Calculus II, Multivariable Calculus, Linear Algebra, Differential Equations with Linear Algebra, Abstract Algebra, General Topology, Geometric Topology (Graduate course), Algebraic Topology (Graduate course)

RESEARCH ACTIVITIES AND DIRECTED STUDIES:

Interests:

Low-dimensional topology, mapping class groups, group theory, classical 3-manifold topology, knot theory, mosaic knots, 3D printing, WeBWorK and online educational tools.

Current Activities

Mosaic Knots: Tile Numbers and Space-Efficiency

Adapting WeBWorK for Secondary Mathematics Education

Bordism theories and the Torelli group I: Integral first homology (with B. Farb.)

Bordism theories and the Torelli group II: Cohomology (with B. Farb.)

Bordism invariants of homology cylinders

Textbook on Differential Equations

Directed Studies and Student Research Projects

2017 *Knot Mosaics*, N. LaCourt

2016 *Human-Computer Interaction*, A. Golfo
– presented at GREAT Day 2016

2016 *Adding Another Dimension: The Applications and Future of 3D Printing Technology*, A. Liang
– presented at GREAT Day 2016

2015 *3D Printing Curriculum*, J. Zomback

2015 *Mosaic Knots*, D. Knowles
– presented at GREAT Day 2015

2015 *3D Printing Curriculum*, J. Zomback and A. Tantillo

2014-15 *A Digital “ProofSpace,” Facilitating a Flipped Classroom for Mathematical Proofs*, S. Uttamchandani

– presented at AMS/MAA Joint Mathematics Meeting, January 2015

– presented at SUNY Conference on Instruction and Technology, May 2015

2014 *Mathematical Manipulatives with 3D Printing*, J. Ford
– presented at MAA Mathfest, Portland, OR, August 2014

2014 *Mosaic Knots*, D. Knowles
– presented at Undergraduate Math Research Symposium, Macaulay Honors College, New York, NY, November 2014

2014 *Class of 2014 Statistical Survey*, S. Dorney and A. Sharpe
– presented at GREAT Day 2014

2013 *Introduction to Mathematical Cryptography*, S. Uttamchandani, S. Clark, J. For

2013 *Adapting WeBWorK for Secondary Mathematics Education*, T. Fisher

2012 *Where Topology Meets Chemistry*, S. Schaefer

2012 *Mathematics Education Projects*, E. Novak

2012 *Algebraic Topology and Geometric Algebra*, M. Vaiana
– presented at GREAT Day 2012

- 2011 *Knot Theory and Fundamental Group*, H. Miller
- 2010 *Game Theory*, G. Henderson
- 2010 *Modeling with Differential Equations*, M. Kotok
– presented at GREAT Day 2010
- 2009 *Graph and Tree Analysis*, G. Henderson
- 2009 *Harmonic Motion Java Simulations*, M. Kotok
– presented at GREAT Day 2009
- 2008-09 *Exploring the Jones Polynomial*, N. Devin
– presented at GREAT Day 2009
- 2007 *Advanced Linear Algebra*, C. Rogers

SERVICE EXPERIENCE:

Service to the Profession

- MAA WeBWorK Consultant (2010-present)
- MAA Seaway Section Extended Executive Committee (2011-2016)
- MAA Gehman Lecture Committee (2010-2016, Committee Chair 2011-2016)

Department Service

- Associate Chair (2015-2016)
- Departmental Committee (2010-2011, 2013-2015, 2017-present)
- Staffing Committee (2011-2017)
- Curriculum Committee (2008-2010)
- Pi Mu Epsilon/Scholarship Committee (2010-present)
- Honors Committee (2012-2013, 2016-present)
- Five Year Review Committee (2013-2015)
- Graduate Advisement Committee (2009-2011, 2016-2017)
- WeBWorK Coordinator (2007-present)
- Website Coordinator (2008-2017)
- Computer Committee (2008-2014)
- PRISM – Faculty Advisor (2008-2013)

- Society of Undergraduate Math Students (SUMS), University of Rochester (2005-2007)
- University of Rochester Liaison for Mathematical Association of America (2005-2007)
- SUMS Tutoring Coordinator, University of Rochester (2005-2007)
- Graduate Student Tutoring Coordinator, Rice University (2001-2004)

University Service

- Academic Advising (2008-present)
- College Senate (2009-2013, 2017-present)
- Committee on Nominations and Elections (2014-2016)
- Graduate Affairs Committee (2009-2013)
- Personal Safety Committee (2012-2016)
- Phi Beta Kappa Historian (2012-2015)
- Presidential Scholars Committee (2010-2011, Chair 2011)
- New York State Master Teacher Interviewer/Evaluator (2014, 2016)

Master Teacher Professional Development Workshop (2015)
TLC New Faculty Mentor (2014-2015)
Steering Committee “Beyond SOFIs: Supporting and evaluating teaching” (2012)
Ratio Christi Geneseo – Faculty Advisor (2013-present)
Cornerstone Campus Ministries (Geneseo Cru) – Faculty Advisor (2009-2014)
PRISM “Pi in the Face for Autism” Fundraiser (2010-2013)
Livingston Cares “Jailbreak” Fundraiser (2010)