

# Diana Davis

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CONTACT INFORMATION	Mathematics Department Swarthmore College 500 College Avenue, Swarthmore PA	(610) 690-3757 ddavis3@swarthmore.edu swarthmore.edu/NatSci/ddavis3
EMPLOYMENT	<b>Swarthmore College</b> , Visiting Assistant Professor <b>Williams College</b> , Visiting Assistant Professor <b>Northwestern University</b> , Postdoctoral Lecturer	2017–2020 2016–2017 2013–2016
RESEARCH INTERESTS	Polygonal billiards, dynamical systems, symbolic dynamics, geodesic flows, translation surfaces, planar tilings, tiling billiards.	
EDUCATION	<b>Brown University</b> Ph.D. in Mathematics, 2013. Advisor: Richard Schwartz Thesis: <i>Cutting sequences on translation surfaces</i> . Sc.M. in Mathematics, 2010.  <b>Williams College</b> B.A. in Mathematics, 2007, <i>cum laude</i> , with honors in mathematics	
PAPERS * STUDENT COAUTHORS	<ol style="list-style-type: none"><li>1. Harrison Bray, Diana Davis, Kathryn Lindsey and Chenxi Wu, <i>The shape of Thurston's master teapot</i>, submitted (2019).</li><li>2. Jon Chaika, Diana Davis, <i>The typical measure preserving transformation is not an interval exchange transformation</i>, submitted (2019).</li><li>3. Diana Davis and Samuel Lelièvre, <i>Periodic trajectories on the double pentagon and golden L</i>, preprint (2018).</li><li>4. Aaron Calderon, Solly Coles*, Diana Davis, Justin Lanier and André Oliveira, <i>How to hear the shape of a billiard table</i>, submitted (2018).</li><li>5. Paul Baird-Smith*, Diana Davis, Elijah Fromm* and Sumun Iyer*, <i>Tiling Billiards on Triangle Tilings, and Interval Exchange Transformations</i>, accepted pending revision in <b>Bulletin of the London Mathematical Society</b> (2019).</li><li>6. Diana Davis, Irene Pasquinelli and Corinna Ulcigrai, <i>Cutting sequences on Bouw-Möller surfaces: an S-adic characterization</i>, to appear in <b>Annales Scientifiques de l'École Normale Supérieure</b> (2019).</li><li>7. Diana Davis and W. Patrick Hooper, <i>Periodicity and ergodicity in the trihexagonal tiling</i>, <b>Commentarii Mathematici Helvetici</b>, 93(4), pp. 661–707 (2018).</li><li>8. Diana Davis, Kelsey DiPietro*, J.T. Rustad*, and Alexander St Laurent*, <i>Negative refraction and tiling billiards</i>, <b>Advances in Geometry</b>, 18(2), 133–159 (2018).</li><li>9. Keith Burns, Orit Davidovich and Diana Davis, <i>Average pace and horizontal chords</i>, <b>Mathematical Intelligencer</b>, 39(4), 41–45 (2017).</li></ol>	

10. Diana Davis, Victor Dods, Cynthia Traub and Jed Yang, *Geodesic trajectories on the regular tetrahedron and the cube*, **Discrete Mathematics**, 340(1), 3183–3196 (2017).
  11. Diana Davis, *Cutting sequences on translation surfaces*, **New York Journal of Mathematics**, Volume 20, 399–429 (2014).
  12. Diana Davis, *Cutting sequences, regular polygons, and the Veech group*, **Geometriae Dedicata**, 162(1), 231–261 (2013).
  13. Diana Davis, Dmitry Fuchs and Sergei Tabachnikov, *Periodic trajectories in the regular pentagon*, **Moscow Mathematical Journal**, Volume 3, 439–461 (2011).
  14. Joseph Corneli, Ivan Corwin, Stephanie Hurder, Vojislav Šešum, Ya Xu, Elizabeth Adams, Diana Davis, Michelle Lee, Regina Visocchi and Neil Hoffman, *Double Bubbles in Gauss Space and Spheres*, **Houston Journal of Mathematics**, 34(1), 181–204 (2008).
  15. Elizabeth Adams, Ivan Corwin, Diana Davis, Michelle Lee and Regina Visocchi, *Isoperimetric Regions in Gauss Sectors*, **Rose-Hulman Undergraduate Mathematics Journal**, 8(1), (2007).
- PEDAGOGY    16. Diana Davis, *Inquiry-based learning in a first-year honors course*, **PRIMUS**, 28(5), 387–408 (2018).
- BOOK    17. Diana Davis, *Lines in positive genus: An introduction to flat surfaces*, in *Dynamics done with your bare hands*, **European Mathematical Society Series of Lecture Notes** (2017).
- EXPOSITION    18. Diana Davis, *Billiards and Flat Surfaces*, **Snapshots of Modern Mathematics for Oberwolfach**, No. 1 (2015).
19. The above was subsequently translated into German and published as *Billard und ebene Flächen*, in **Notices of the German Mathematical Society**, Volume 23, Issue 3, 151–155 (2015).
- HONORS AND    Northwestern University, Math Dept award for Excellence in Teaching    2016  
 AWARDS    Brown University, Presidential Award for Excellence in Teaching finalist    2012  
                   “Dance Your Ph.D.” competition winner – Physics and Math category    2012  
                   Brown University, Math Dept Outstanding Teaching Award    2011  
                   Williams College, Morgan Prize for Excellence in Teaching    2007
- GRANTS    NSF Analysis grant - RUI    (applied 2019)  
                   AWM ADVANCE grant for Women in Dynamical Systems    (applied 2019)  
                   AMS Travel Grant for the ICM in Seoul, South Korea (\$3700)    2014  
                   GAANN Fellowship (graduate student salary support)    2010–2012

TEACHING EXPERIENCE	<b>Courses taught using a problem-centered curriculum that I wrote, with a discussion-based classroom</b>	
	Calculus I	Swarthmore F17
	Discrete mathematics with gerrymandering	Swarthmore F18
	Multivariable calculus	Nw S16; Will S17; Sw F18, S19, S20
	Real analysis	Swarthmore S18, F19
	Introduction to proof	Northwestern S16
	Geometry, surfaces & billiards	Williams F16
<b>Courses taught in the lecture method</b>		
	The magic of numbers	Northwestern W14
	Combinatorial game theory	Northwestern S14
	Calculus I	Brown F10
	Multivariable calculus	Brown F11; Nw W14, F14, W15, W16; Sw S18
	Linear algebra	Brown S13; Nw F13, F14, F15
	Introduction to proof	Northwestern F13, S14
	Applied real analysis	Williams F16
<b>Course Head for first-year honors sequence at Northwestern 2015–2016</b>		
Coordinated instruction and exams for six sections, four instructors, three TAs		
MINI COURSES	Summer School on Boundaries and Dynamics, Notre Dame University May 2015	
	A 4-day, 6-hour introduction to flat surfaces for undergraduates Lecture notes from this course are the book [17]	
	Anja Greer Conference on Mathematics and Technology 2012, '13, '15, '17, '19	
	6-day, 10-hour courses for high school math teachers, on how to write and teach a problem-centered, discussion-based math course	
RESEARCH STUDENTS	Undergraduate thesis students at Williams College 2016–2017	
	Megumi Asada	<i>Periodic paths on the triangle and hexagon billiard tables</i>
	Paul Baird-Smith	<i>Finite systems of fixed-length cranks</i>
	Dylanger Pittman	<i>Double bubbles on the real line with log-convex density</i>
SUMMER RESEARCH PROGRAMS ADVISED	Research mentor, PROMYS, Boston University Summer 2019	
	Gerrymandering research project for five high school students	
	Polygonal Billiards cluster at Tufts University	Summer 2017
	Participated equally with faculty, postdocs, grad students and undergrads, resulting in the paper [4]	
	SMALL REU at Williams College	Summer 2016
	Advised three students on tiling billiards, resulting in the paper [5]	
	Summer@ICERM REU Summers 2012, 2013	
	Advised groups of students, leading to three publications including [8]	

CONFERENCE ORGANIZATION	* Women in Dynamical Systems (WINDS) conference (proposed)	June 2020
	Organizer, LGBTQ+ geometry & dynamics conference at Michigan	June 2019
	MAA session on Beauty & Art from Research Mathematics at JMM	Jan. 2019
	AMS MRC on dynamical systems, conference assistant	June 2017
SERVICE	AMS Epsilon Fund committee	2019–2020
	Swarthmore organizer for student lunches with colloquium speakers	2019–2020
	Swarthmore College AWM student chapter advisor	2018–2020
	Williams College AMS student chapter advisor	2016–2017
	Williams College faculty affiliate to Men’s and Women’s Cross Country	2016–2017
	Northwestern University Women in Mathematics co-organizer	2014–2016
	Northwestern University Dynamics Seminar co-organizer	2013–2015
	AMS Graduate Working Group Committee	2010–2011
	AMS Graduate Student Blog	2009–2012
	Brown University Running Club president	2009–2012
REFEREE FOR	<i>Journal of the American Mathematical Society, American Mathematical Monthly, Dynamical Systems, Experimental Mathematics</i>	
INVITED RESEARCH VISITS	Fall 2019      14 weeks      Illustrating Mathematics semester, ICERM	
	March 2019      1.5 weeks      Institut des Hautes Études Scientifiques	
	July 2018      1 week      Lyon, France; with Olga Paris-Romaskevich	
	March 2018      1 week      Boston; with Kathryn Lindsey & Chenxi Wu	
	January 2018      1.5 weeks      Tel Aviv, Israel; with Barak Weiss	
	October 2017      1.5 weeks      Seattle; with Jayadev Athreya & Samuel Lelièvre	
	July 2015      3 weeks      Paris, France; with Samuel Lelièvre	
OUTREACH FOR CHILDREN	Females Excelling in Math, Engineering, and Science, Michigan	Nov. 2017
	Take our Children to Work Day, Northwestern University	April 2016
	<a href="#">Hands-on activity on the Fold-and-Cut Theorem</a>	
OTHER EXPOSURE	My mathematical art has been shown at:	
	ICERM, Illustrating Mathematics art exhibition, Providence, RI	Fall 2019
	Mathpalooza! Julia Robbins Math Festival, Atlanta, GA	March 2019
	JMM Mathematical Art Exhibition, Baltimore, MD	January 2019
	My <a href="#">“viral video” explaining my Ph.D. result through dance</a> has been shown at:	
	<a href="#">Public lecture for high school students</a> , Seoul National Univ.	March 2018
	ICM (Seoul), <a href="#">IMAGINARY Exhibition</a>	August 2014
	Bridges Conference (Seoul), <a href="#">Short Movie Festival</a>	August 2014
	Heidelberg Laureate Forum, in <a href="#">Curt McMullen’s talk</a>	September 2013

TALKS	<b>I have given over 100 talks in 21 states and 9 countries:</b>	
KEYNOTE	Fields Institute, Symposium for M. Mirzakhani, student talk	November 2018
TALKS	University of Oklahoma Math Day, plenary speaker	November 2019
INTERNATIONAL	University of Bristol (U.K.)	February 2012
TALKS	Freie Universität Berlin (Germany)	November 2012
	Oxford University (U.K.)	December 2012
	Oberwolfach, conference on flat surfaces (Germany)	March 2014
	CIRM, two conferences on Teichmüller space (France)	July 2015, Feb. 2017
	Tel Aviv University (Israel)	January 2018
	Institut Fourier, conference on Teichmüller dynamics (France)	June 2018
	Aix-Marseille Université (France)	July 2018
	Trinity College, Hamilton Geometry & Topology Workshop (Ireland)	Aug. 2018
	Institut des Hautes Études Scientifiques (France)	March 2019
	University of Luxembourg (Luxembourg)	June 2019
	Brazil-France Joint Mathematical Congress, IMPA (Brazil)	July 2019
SELECTED	Harvard University, Geometry & Dynamics Seminar	February 2013
SEMINAR	Yale University, Geometry & Topology Seminar	April 2013
TALKS	University of Illinois, Ergodic Theory Seminar	April 2014
	University of Utah, Max Dehn Seminar	April 2014
	Northwestern University, Dynamics Seminar	October 2013, January 2015
	University of Minnesota, Combinatorics Seminar	February 2015
	University of Chicago, Dynamics Seminar	March 2014, November 2015
	Penn State University, Dynamical Systems Seminar	November 2015
	U.S. Naval Academy, Seminar	January 2016
	City University of New York, Dynamical Systems Seminar	April 2017
	Brown University, Geometry & Topology Seminar	November 2017
	University of Michigan, Geometry Seminar	November 2017
	University of Maryland, Dynamics Seminar	February 2013, March 2018
	Boston College, Dynamics Seminar	March 2018
	Boston University, Dynamical systems seminar	January 2019
	Rutgers University, Topology seminar	March 2019
	Ohio State University, Ergodic theory seminar	April 2019
	Duke University, Geometry & Topology seminar	September 2019
SELECTED	Tufts University	February 2013
COLLOQUIA	Simons Center for Geometry and Physics	July 2013
	Gonzaga University	January 2016
	Lehigh University	November 2016
	Villanova University	September 2017
	Appalachian State University	April 2019
	Yale University, SUMRY program	July 2017, July 2019
	Brown University	October 2019
	The College of New Jersey	October 2019

SUMMER RESEARCH	Director's Summer Program, National Security Agency Solving applied problems relating to national defense SMALL REU, Williams College Geometry Group with Frank Morgan, leading to two publications [14, 15]	2007  2005
HIGH SCHOOL TEACHING	<b>Phillips Exeter Academy</b> Teaching Fellow in Mathematics Summer School Faculty	Academic year 2007–2008 Summers 2008, '09, '10, '11, '14
	<b>Northfield Mount Hermon School</b> Summer School Faculty	Summer 2006
STUDENT COLLOQUIUM TALKS ADVISED	<b>Williams College</b> Troy Cipprelle Si Young Mah D. Patrick Gainey Chinmayi Manjunath Ariana Ross Bridget Bousa Megumi Asada Paul Baird-Smith Dylanger Pittman	2016–2017 <i>The art (and math) of illumination</i> <i>Map coloring for mathematicians</i> <i>Geodesics on the tetrahedron</i> <i>Seven bridges of Königsberg</i> <i>The Fold-and-Cut problem</i> <i>Julia sets and the Mandelbrot set</i> <i>Periodic paths on the triangle and hexagon billiard tables</i> <i>Finite systems of fixed-length cranks</i> <i>Double bubbles on the real line with log-convex density</i>
	I advised 9/90 of the year's colloquium talks, and 3/5 of the year's five best talks.	
OTHER SKILLS	I program in Sage for my research; also familiar with Java, C++, HTML Conversational and mathematical French Competitive long-distance runner I ran every day (at least 2 miles) for over 6 years, from 2009–2015 PRs: mile - 5:01, 5k - 17:03, 10k - 35:35, half marathon - 1:21:09 Certified in CPR, 14-passenger mini bus driving, safe small boat handling	
REFERENCES	Richard Schwartz, Brown University (Ph.D. advisor) Curtis McMullen, Harvard University Moon Duchin, Tufts University John Smillie, University of Warwick Sergei Tabachnikov, Penn State University Keith Burns, Northwestern University John Alongi, Northwestern University Susan Loepp, Williams College	