David A. Constantine   **Curriculum Vitae**

Contact Information

Department of Mathematics   (860) 685-2167
& Computer Science   dconstantine@wesleyan.edu
Wesleyan University   dconstantine.faculty.wesleyan.edu
609 Exley Science Center
265 Church St.
Middletown, CT 06459

Positions

2019-present	Associate Professor
	Department of Mathematics & Computer Science
	Wesleyan University
2012-2019	Assistant Professor
	Department of Mathematics & Computer Science
	Wesleyan University
2009-2012	L.E. Dickson Instructor
	Department of Mathematics
	University of Chicago
	Sponsor: Benson Farb
Fall 2009	Visiting Postdoc
	Hausdorff Institute for Mathematics
	Bonn, Germany

Education

2004-2009	**University of Michigan**
	Ph.D. in Mathematics
	Advisor: Ralf Spatzier
2000-2004	**Eastern Nazarene College**
	B.S. in Mathematics
	B.S. in Physics

Research

- **Research Interests:** Riemannian geometry, dynamics, rigidity, metric geometry, homogeneous dynamics, Lie groups, symmetric spaces, representation varieties, pseudo-Riemannian geometry

Accepted or Published Work

1. Joint with Harrison Bray, *Entropy rigidity for finite volume strictly convex projective manifolds*, to appear in Geometriae Dedicata (17 pages).

2. Joint with Jean-François Lafont and Daniel Thompson, *Strong symbolic dynamics for geodesic flow on CAT(-1) spaces and other metric Anosov flows*, Journal de l'École polytechnique – Mathématiques, **7** (2020) 201-231.

3. Joint with Jean-François Lafont and Daniel Thompson, *The weak specification property for geodesic flows on CAT(-1) spaces*, Groups, Geometry, and Dynamics, **14**, Issue 1 (2020) 297-336.

4. Joint with Ilesanmi Adeboye and Harrison Bray, *Entropy rigidity and Hilbert volume*, Discrete and Continuous Dynamical Systems, **39** No. 4, (2019) 1731-1744.

5. Joint with Jon Chaika, *Quantitative shrinking target properties for rotations and interval exchanges*, Israel Journal of Mathematics, **230** No. 1, (2019) 275-334.

6. Joint with Jon Chaika, *A quantitative shrinking target result on Sturmian sequences for rotations*, Discrete and Continuous Dynamical Systems, **38** No. 10 (2018), 5189-5204.

7. Joint with Jean-François Lafont, *Marked length rigidity for Fuchsian buildings*, Ergodic Theory and Dynamical Systems **39** (2019), 3262-3291.

8. Joint with Jean-François Lafont, D. Benjamin McReynolds and Daniel Thompson, *Fat flats in rank-one manifolds*, Michigan Mathematics Journal **68** (2019), 251-275.

9. *Marked length spectrum rigidity in nonpositive curvature with singularities*, Indiana University Mathematics Journal **67** No. 6 (2018), 2337-2361.

10. Joint with Jean-François Lafont, *Marked length rigidity for one dimensional spaces*, Journal of Topology and Analysis **11** No. 3 (2019), 585-621.

11. Joint with Joanna Furno, *Everywhere divergence of the one-sided ergodic Hilbert transform for circle rotations by Liouville numbers*, New York Journal of Mathematics **23** (2017), 273-294.

12. Joint with Jean-François Lafont, *On the Hausdorff dimension of $CAT(\kappa)$ surfaces*, Analysis and Geometry in Metric Spaces **4** (2016), 266-277.

13. *Compact Clifford-Klein forms – geometry, topology and dynamics*, In "Geometry, Topology, and Dynamics in Negative Curvature," 110-145. London Mathematical Society Lecture Notes Series **425**, Cambridge Univ. Press, Cambridge, 2016.

14. *2-Frame flow dynamics and hyperbolic rank-rigidity in nonpositive curvature*, Journal of Modern Dynamics **2** (2008), no. 4, 719-740.

15. *Lengths of finite dimensional representations of PBW algebras*, with M. Darnall, Linear Algebra and its Applications **395** (2005) 175-181.

Submitted Work

1. Joint with Benjamin Call, Alena Erchenko, Noelle Sawyer, and Grace Work, *Unique equilibrium states for geodesic flows on flat surfaces with singularities*, (27 pages).

Graduate Students

Leyla Yardımcı (Ph.D. student, current)

Noelle Sawyer (Ph.D. student, 2020)

Cameron Bishop (Ph.D. student, current)

Honors and Awards

- AIM SQuaREs grant, "Thermodynamic formalism for CAT(0) spaces" (joint with Benjamin Call, Alena Erchenko, Noelle Sawyer, and Grace Work), 2021

- National Science Foundation Graduate Research Fellowship, 2004-2009

- Alice Webber Glover in Math Scholarship, University of Michigan, Summer 2006

Professional Activities

Invited Talks:

- University of Utah Colloquium, Sept 23, 2021
- Brigham Young University Colloquium, Jan 14, 2020
- Ohio State University Topology Seminar, Sept 9, 2019, Sept 8, 2015, Jan 14, 2014 & Dec 2, 2011
- Summer Wasatch Topology Conference (Midway, Utah), August 14-16, 2019
- Arches Topology Conference (Hurricane, Utah), April 24-27, 2019
- University of Michigan Geometry Seminar, Mar 29, 2019, Jan 13, 2009, & Mar 13, 2007
- Wesleyan University, Dynamics Seminar, Sept 2018 & Oct 2012
- University of Connecticut Awards Day Colloquium, Apr 25, 2018
- Ohio State University Ergodic Theory Seminar, Jan 18, 2018; Jan 19, 2017; & Nov 12, 2015
- City College of New York Colloquium, Nov 16, 2017
- Spring Topology and Dynamics Conference (New Jersey City University), semi-plenary speaker, March 8-11, 2017
- Wesleyan University Topology et al Seminar, September 28, 2016
- Dartmouth University Colloquium, May 5, 2016
- Tufts University Colloquium, Apr 1, 2016
- University of Chicago Dynamics Seminar, Oct 19, 2015, Feb. 24, 2009 & Oct. 31, 2007
- *Ahlfors-Bers Colloquium, parallel session in Dynamics*, Yale University, Oct 26, 2014

- Binghamton University Geometry and Topology Seminar, Oct 9, 2014 & Oct 23, 2008
- *Special Session on Wild Algebraic and Geometric Topology* and *Special Session on Groups and Topology, Joint DMV-PTM meeting*, Poznan (Poland), Sept 17-20, 2014
- University of Connecticut, PDE and Differential Geometry Seminar, Sept 30, 2013
- University of Massachusetts Amherst, Applied Analysis & Computation Seminar, Sept 10, 2013
- CUNY Graduate Center, Complex Analysis and Dynamics Seminar, Dec 7, 2012
- Yale University, Dynamics of Group Actions Seminar, Oct 29, 2012
- Brown University, Group Actions, Dynamics and Geometry Seminar, Oct 18, 2012
- *Cartan connections, geometry and topology of homogeneous spaces*, Erwin Schrödinger Institute, Vienna, Austria, July 18-22, 2011.
- University of Illinois at Chicago, Geometry, Topology and Dynamics Seminar, Mar 14, 2011
- University of Chicago Geometry Seminar, Apr. 13, 2010
- Princeton University Group Actions Seminar, Apr. 6 2010
- Indiana University Geometry Seminar, Mar. 25, 2010
- University of Illinois Urbana-Champaign, Differential Geometry Seminar, Ma5 18, 2010
- Northwestern University Dynamical Systems Seminar, Feb. 2, 2010 & Nov 27, 2007
- *Geometry, Topology and Dynamics in Negative Curvature*, Raman Research Institute, Bangalore, India, satellite to ICM, August 2-7, 2010.
- *AMS Special Session on Group Actions on Homogeneous Spaces and Applications*, Joint Mathematics Meetings, Washington, DC, Jan 5-9, 2009
- *Dynamical Systems: Geometric Structures and Rigidity Workshop* (Banach Center, Będlewo, Poland) July 7-26, 2008
- *Special Session in Differential Geometry and Its Applications, AMS Sectional Meeting*, Chicago, IL, Oct. 6 2007

- Ohio State University Geometric Group Theory Seminar, May 9, 2007
- Oklahoma University Geometry and Topology Seminar, April 18, 2007
- *Special Session in Metric Geometry, Joint AMS-MMS Meeting*, Zacatecas, Mexico, May 23-26, 2007
- *Special Session in Geometric Topology, AMS Sectional Meeting* Oxford, OH, Mar. 17, 2007
- Indiana University Differential Geometry Seminar, Feb. 15, 2007

Selected Research Conferences Attended:

- *Equilibrium states for dynamical systems arising from geometry* American Institute of Mathematics, Jul 15-19, 2019
- *Geodesics on Real Hyperbolic Manifolds* Connecticut College, Aug 9-11, 2018
- *No Boundaries: Groups in Algebra, Geometry, and Topology* University of Chicago, Oct 27-29, 2017.
- *Geometries, Surfaces and Representations of Fundamental Groups* University of Maryland, June 22-24, 2016.
- *Midwest Dynamical Systems Meeting* Ohio State University, Oct 30-Nov 1, 2015.
- *Ahlfors-Bers Colloquium* Yale University, Oct 23-26, 2014
- *Teichmüller theory and surfaces in 3-manifolds* Centro di Ricerca Matematica Ennio De Giorgi, Pisa, May 26-June 20, 2014
- *Second GEAR Network Retreat* University of Maryland, March 17-21, 2014
- *Workshop in Dynamical Systems* Penn State University, Oct 4-7, 2018; Oct. 17-20, 2013; & Nov. 2-5, 2006
- *Cube complexes and 3-manifolds*, University of Illinois-Chicago, Chicago, May 20-30 2013
- *Geometric Structures and Representation Varieties Summer Retreat*, University of Illinois, Urbana-Champaign, IL, July-August 2012

- *Cartan connections, geometry and topology of homogeneous spaces*, Erwin Schrödinger Institute, Vienna, Austria, July 18-22, 2011
- *International Conference on Ergodic Geometry*, University Paris-Sud, Orsay, France, May 23-27, 2011
- *Geometry, Topology and Dynamics in Negative Curvature*, Raman Research Institute, Bangalore, India, satellite to ICM, August 2-7, 2010
- *Dynamical Systems: Geometric Structures and Rigidity* Banach Center, Będlewo, Poland, July 7-26, 2008
- *Equidistribution on Homogeneous Spaces* Ohio State University, June 9-13, 2008
- *Geometry, Rigidity and Group Actions: In Honor Of Robert J. Zimmer's 60th Birthday* University of Chicago, Sept. 7-9, 2007
- *Clay Summer School on Homogeneous Flows, Moduli Spaces and Arithmetic* Pisa, Italy, June 11 - July 6 2007
- *Geometry, Topology and Their Interactions* Morelia, Mexico, Jan. 8-13, 2007
- *Future Directions in Riemannian Geometry* University of Maryland, Sept. 22-24, 2006
- *International Conference on Global Dynamics Beyond Uniform Hyperbolicity* Northwestern University, May 17-22, 2006
- *Bloomington Geometry Workshop* Indiana University, April 7-9, 2006

Teaching Conferences Attended:

- *SIMIODE Practitioners Workshop, MINDE – Model INstructors in Differential Equations*, Online, June 7-11, 2021
- *Graduate Advisor Workshop*, Ohio State, June 1-2, 2019
- *Directed Reading Program Workshop* MIT, May 25-26, 2018
- *Inquiry-Based Learning Workshop* Kenyon College, June 23-26, 2014

Committee Work:

- PhD Thesis Committee for André Oliveira, 2021
- Graduate Education Committee, Wesleyan University, 2020-21, 2012-13

- McNair Program Faculty Advisory Committee, 2018-21
- University Prizes and Examination Committee, 2018-19
- Space Committee, 2017-18
- Master's Thesis Committee for Max Ryan, Wesleyan University, 2016
- Curriculum Committee, Spring 2016
- Math Department Hiring Committee, 2015
- College of Integrative Sciences Steering Committee, 2015, 2019
- Faculty Advisor to Undergraduate Math Club, 2014-15
- Colloquium Chair, 2013-14, 2016-17
- Master's Thesis Committee for Randy Linder, Wesleyan University, 2014
- Master's Thesis Committee for Ian Hoffman, Wesleyan University, 2013
- Outside reader for Natalie McGathey's Ph.D. Thesis *Invariant measures and homeomorphisms of boundaries*, University of Illinois at Chicago, 2011

Seminars Organized:

- Dynamics and Analysis Seminar, Wesleyan University, 2013-present
- Colloquium, Wesleyan University, 2013-2014, 2016-2017
- Geometry/Topology Seminar, University of Chicago, 2010-2012
- Student Topology/Geometry Seminar, University of Michigan 2007-2008

Memberships:

- American Mathematical Society, 2005-present

Teaching Experience

Wesleyan University:

- Introductory Calculus, Fall 2014
- Elementary Statistics, Spring 2019, Spring 2019 & Fall 2016

- Intermediate Statistics, Fall 2020
- Problem Solving for the Putnam, Fall 2018
- Vectors and Matrices, Spring 2018, Spring 2013 & Fall 2013
- Fundamentals of Analysis, Spring 2017, Spring 2014 & Spring 2013
- Discrete Mathematics, Spring 2018
- Differential Equations, Spring 2019, Fall 2017 & Fall 2014
- Introduction to Probability, Fall 2020 & Fall 2013
- Mathematical Statistics, Spring 2021, Spring 2019, Spring 2017 & Spring 2015
- Differential Geometry, Spring 2016 & Fall 2012
- Fundamentals of Analysis II, Fall 2018
- Graduate Analysis I (Real), Spring 2014
- Graduate Analysis I (Complex), Spring 2016
- Graduate Analysis II: Riemannian Geometry, Spring 2021 & Fall 2012; Periodic Orbits and Dynamical Zeta Functions, Fall 2018; Lie Theory and Symmetric Spaces, Fall 2017; Symplectic Geometry, Fall 2016; Hyperbolic Dynamics, Spring 2015
- General Relativity (informal tutorial with Joseph Schindler, Physics Master's student), Spring 2013
- Mathematical Statistics – tutorial with Hannah Korevaar and Chris Skypeck, Fall 2013; tutorial with Jeanne Li, Spring 2018
- Geometry and General Relativity – tutorial with Ty Holzschuh, Spring 2014
- Partial Differential Equations and Economics – tutorial with Joyee Sun, Fall 2018
- Honors Projects: Yaqian Tang, Fall 2020; Borworn Satayopas, Spring 2015; Ty Holzschuh & Brian Gapinski, Spring 2014

University of Chicago:

- Honors Abstract Algebra III, Spring 2012 & Spring 2011
- Honors Abstract Algebra II, Winter 2012
- Honors Abstract Algebra I, Fall 2011
- Point-Set Topology, Winter 2011 & Winter 2012

- Abstract Algebra I, Fall 2010
- Analysis in $\mathbb{R}^n$ III, Spring 2010
- Introduction to Analysis and Linear Algebra, Winter & Spring 2010
- Linear Algebra, Winter 2010

University of Michigan:

- Calculus I, Fall 2005
- Calculus II, Winter 2006, Winter 2008
- Assistant Course Coordinator, PreCalculus, Fall 2007

Special Projects

University Lecture:

- Christopher Rasmussen (Math), Abigail Hornstein (Econ) and I proposed and were awarded funding from the Allbritton Center for the Study of Public Life for a University Lecture. We hosted Cathy O'Neil for a talk on the role of math, finance, and data science in public life on May 21, 2016.

Science Writing Talks:

- In collaboration with the Writing at Wesleyan Program, I organized two science writing talks aimed at undergraduates: Evelyn Lamb (Nov 6, 2012) and Anna Haensch (Apr 30, 2015).

3D Printing of Mathematical Models:

- Jointly with Illesanmi Adeboye, I obtained a GISOS Pedagogy grant from Wesleyan for a project to involve students in conceiving, designing and 3D printing models of various mathematical objects. See http://3dmathmodels.site.wesleyan.edu/ for a description of the project and our work. 2013-2014.

Research with Undergraduates

Wesleyan Summer Science Research Program:

- Research mentor for Jeanne Li, *Topological pressure and coding sequences in DNA*; and Alejandra Marcelino, *Dynamical systems in neuroscience*, 2017

- Research mentor for Fanying Chen, *Geometry and intersection distribution for curves*, 2016
- Research mentor for Narin Luangrath and Melissa Mischell, *Length spectrum rigidity for metric graphs*, 2015

University of Chicago REU:

- Lecture series (with William Lopes), *Lies, damned Lies and geometry*, Summer 2012
- Lecture series (with D. Ben McReynolds), *Geometry and dynamics on tori*, Summer 2011
- Research mentor, Summer 2011

  Michael Wong, *The Riemann-Roch Theorem and Abel's Theorem*

  Daphne Kao, *Angle Rigidity for $\mathbb{T}^2$*

  Jahan Claes, *Spectral rigidity on $\mathbb{T}^n$*

  Alexander Tolish, *The Effect of Gravitational Radiation on the Observational Period of Pulsars*

  Petar Yanakiev, *The Uniformization Theorem and Universal Covers*

  Ian Alevy, *Expander Graphs and Property (T)*

  Kao Zi Chong, *Classical Mechanics: the Three-Body Problem*

- Research mentor, Summer 2010

  Watee Srinin, *Measure theoretic aspects of dynamical systems*