

ELIZABETH J DENNE

CURRICULUM VITAE 2015-2023

CURRENT ADDRESS

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CITIZENSHIP (dual) USA and Australia.

POSITIONS HELD

Professor June 2022– present
Washington & Lee University, Department of Mathematics
Associate Professor June 2015 – May 2022
Washington & Lee University, Department of Mathematics
Assistant Professor July 2012 – May 2015
Washington & Lee University, Department of Mathematics
Assistant Professor July 2007 – June 2012
Smith College, Department of Mathematics & Statistics
Benjamin Peirce Assistant Professor July 2004 – June 2007
Harvard University, Department of Mathematics

ACADEMIC DEGREES

Ph.D. Mathematics University of Illinois, Urbana-Champaign. Aug. 1998 – May 2004
Thesis Advisor: Professor John M. Sullivan
Thesis Title: *Alternating Quadriseccants of Knots*
B.Sc. (Hons) University of Sydney, Australia. First class Honours. Feb. 1993 – Dec. 1997
Thesis Advisor: Dr Donald Cartwright
Honours Thesis: *The Uniformization Theorem for Riemann Surfaces*

RESEARCH

Published Also found on the [math arXiv](#)

- (1) *Quadriseccants give new lower bounds for Ropelength*, with Y. Diao, J.M. Sullivan. *Geometry and Topology* **10** (2006), 1–26
- (2) *Convergence and Isotopy for Graphs of Finite Total Curvature*, with J.M. Sullivan. In *Discrete Differential Geometry*, Birkhäuser, (2008). 163–174
- (3) *The distortion of a knotted curve*, with J.M. Sullivan. *Proc. Amer. Math. Soc.* **137** (2009) no. 3, 1139–1148
- (4) [Knots, Molecules and the Universe: an Introduction to Topology](#), with Erica Flapan & 17 other members of the Undergraduate Faculty Program at PCMI (July 2011). This is an introductory undergraduate textbook on topology. American Mathematical Society, 2016.

- (5) *Ribbonlength of folded ribbon unknots in the plane*, with Mary Kamp, Rebecca Terry and Xichen (Catherine) Zhu. Published in the AMS Contemporary Mathematics Vol 689: *Knots, Links, Spatial Graphs, and Algebraic Invariants*, edited by E. Flapan, Allison Henrich, A. Kaestner, and S. Nelson (2017) 37–51. <http://dx.doi.org/10.1090/comm/689/13855>
- (6) *Quadriseccants and essential secants of knots: with applications to the geometry of knots*. Published in *New directions in Geometric and Applied Knot Theory*, edited by Simon Blatt, Philipp Reiter, and Armin Schikorra. De Gruyter (2018).
- (7) *Folded Ribbon Knots in the Plane* has been published in the *Encyclopedia of Knot Theory* edited by Colin Adams, Erica Flapan, Allison Henrich, Louis Kauffman, Lew Ludwig, and Sam Nelson. Published by CRC/Taylor & Francis (2020).
- (8) *The Mathematics of Tie Knots*, with C. Joireman, Allison Young. Published in *Involve*, Vol. 14 (2021) No. 2, pp 241–270. DOI: [10.2140/involve.2021.14.241](https://doi.org/10.2140/involve.2021.14.241)
- (9) *Ribbonlength and crossing number for folded ribbon knots*. Published in *J. Knot Theory Ramifications*, Vol. 30, No. 4, 2150028 (2021) DOI: [10.1142/S0218216521500280](https://doi.org/10.1142/S0218216521500280)
- (10) *Configuration Spaces, Multijet Transversality, and the Square-peg Problem*, with Jason Cantarella and John McCleary. Published in the *Illinois Journal of Mathematics* vol. 66, no. 3 pages 385–420, September 2022. <https://doi.org/10.1215/00192082-10120454>
- (11) *Families of similar simplices inscribed in most smoothly embedded spheres*, with Jason Cantarella and John McCleary. Published in *Forum of Mathematics, Sigma*, Volume 10, 2022, e101. DOI: <https://doi.org/10.1017/fms.2022.88>
- (12) *Ribbonlength of families of folded ribbon knots*, with J.C. Haden, T. Larsen. Published in *Involve, a journal of mathematics* 15-4 (2022), 591–628. DOI [10.2140/involve.2022.15.591](https://doi.org/10.2140/involve.2022.15.591)

Accepted

- (1) *Linking number and folded ribbon unknots*, with Troy Larsen. Accepted by the *Journal of Knot Theory and its Ramifications* (Nov 22, 2022). Preprint [arXiv:2208.03239](https://arxiv.org/abs/2208.03239) 36 pages, 21 figures.

Submitted

- (1) *Square-like quadrilaterals inscribed in embedded space curves*, with J. Cantarella and J. McCleary. Preprint: [ArXiv: 2103.13848](https://arxiv.org/abs/2103.13848) (11 pages, 2 figures).

Unpublished

- (1) *Alternating Quadriseccants of Knots*. Preprint <https://arxiv.org/abs/math/0510561> (37 pages, 22 figures).
- (2) *On the Total Curvature of a Nonplanar Knotted Curve* by Istvan Fàry. Translated from French. Original paper: *Sur La Courbure Totale D'une Courbe Gauche Faisant un Noeud*. *Bull. Soc. Math. France*. Vol 77, 1949 128–138.
- (3) *An Elementary Geometric Property of Links and Knots* by Erika Panwitz. Translated from German (with Thomas Kuhnt). Original paper: *Eine elementargeometrische Eigenschaft von Verschlingungen und Knoten*. *Math. Annal.* 108 (1933), 629–672.

3D MATH VISUALIZATION

Blog: *Visions in Math* <http://mathvis.academic.wlu.edu/>

Entries describe how models were made, including how design & print problems were solved.

Thingiverse: The files for all my 3D printed mathematical models can be found at <http://www.thingiverse.com/dennedesigns/>

OUTREACH & MUSEUM EXHIBITS

- (1) June 2020 Interviewed by Kevin Hartnett from Quanta Magazine about new work on the *inscribed rectangles problem*. Comments found in [New Geometric Perspective Cracks Old Problem About Rectangles](#).
- (2) July 2020 Advisor and mentor for BEAM's career days. [BEAM \(Bridge to Enter Advanced Mathematics\)](#) is an organization dedicated to bringing underserved students into advanced mathematics.
- (3) [Taping Shape 2.0: Why Knot?](#) at the Fleet Science Center, San Diego, CA (Feb 22 – Sep 30, 2018). Co-developed this mathematical museum exhibit about knots and topology.
- (4) [Taping Shape](#) exhibit at the Rueben H. Fleet Science Center in San Diego, California (Jan 30 – Sep 5, 2016). Created the Schwarz P surfaces, Schwarz P soap film frame, and Pair-of-pants surfaces.

GRANTS and AWARDS

- Summer 2013 – 20, 2022 **Lenfest Grant** for faculty research, Washington & Lee University.
- June 2019 **co-PI** on an **NSF conference grant** to support graduate students and postdocs to attend BAGEL19, a two week summer school and conference at the IMA (Institute for Mathematics and its Applications) Minneapolis MN, June 17 – 28, 2019.
- Oct. 2015 **co-PI** on a **Simons Center for Geometry and Physics Grant** to hold a workshop I co-organized titled [Symplectic and Algebraic Geometry in the Statistical Physics of Polymers](#) at the center during October 12–16, 2015.

RESEARCH EXPERIENCES for UNDERGRADUATES

Washington & Lee University

- Summer 2020 John Carr Haden '22, Troy Larsen '22 on *Minimizing ribbonlength for folded ribbon knots*.
- Summer 2018 Corinne Joireman '21, Allison Young '20 on *Knot theory and tie knots*.
- Summer 2015 Emily Jaekle '16, Ryan McDonnell '17 on *Mathematics & 3D printing*.
- Summer 2014 Mary Kamp '15, Xichen Zhu '17 on *Folded ribbon knots in the plane*.

TEACHING

Washington & Lee University July 2012 – present.

Taught a wide variety of courses. Complete details found [here](#).

100-level & 200-level courses: Calculus I, Calculus II, Multivariable Calculus, Linear Algebra, and Fundamental Concepts of Mathematics.

300-level courses: Real Analysis, Introduction to Topology, Geometry, Modern Geometry, Calculus on Manifolds, Probability, Statistics, and Introduction to Knot Theory.

INVITED TALKS

Complete details found [here](#).

Some highlights: I've spoken at Oberwolfach, Germany; KAIST Daejong, Korea; University of Basel, Switzerland, UnKnot Conferences I–IV, as well as many AMS, MAA and SIAM Special Sessions.

SERVICE – Washington & Lee University

- Department of Mathematics

- AY 2021-23 Course Scheduling Committee for the Mathematics Department
- AY 2021-23 Colloquium Chair for the Mathematics Department
- Winter 2022 Member of the subcommittee to review Math 201 prerequisites
- Winter 2014 – present Maintain the Math Department’s webpage & Facebook page
- AY 2020-21 Job search committee (1 tenure-track & 1 visiting assistant professor)
- AY 2019-20 Colloquium Chair for the Mathematics Department
- Winter 2019 Job search committee for 1 visiting assistant professor
- Fall 2019 Job search committee for Target of Opportunity Hire
- AY 2018-19 Colloquium Chair for the Mathematics Department
- Winter 2018 Data collector for FM courses and Algebra/Analysis courses
- AY 2017-18 Job search committee (1 tenure-track & 1 visiting assistant professor)
- Winter 2017 Committee for 10 year review

- University service

- AY 2021-2026 Member of Academic Calendar, Scheduling & Registration Committee
- AY 2018-2023 Faculty Mentor to new faculty
- AY 2021-2023 Co-organizer of WiMSE (Women in Math, Science, & Engineering) faculty cohort
- AY 2021-2022 Member of the Peer Mentor Working Group
- AY 2021-2022 Member of Fellowships Committee (1 year sabbatical replacement)
- Summer 2021 Member of the Advising Team for incoming first year students.
- AY 2018-2020 Member of UCICC (University Committee on Inclusiveness and Campus Climate)
- March 2013, 2017, 2018, 2019, 2020 Faculty interviewer for the Johnson Scholarship
- AY 2017-2019 Organizer of WiMS (Women in Math and Science) faculty cohort
- AY 2018-2019 Organizing committee for SSA (Science, Society and the Arts) 2019
- AY 2018-2019 Member of the Public Functions Committee

PROFESSIONAL ACTIVITIES and SERVICE

July 2007 – present **Referee** for articles in various mathematics journals. These include:

Algebraic and Geometric Topology, Journal of Geometry Geometry and Topology, Topology and its Applications, Journal of Knot Theory and its Ramifications, Kobe Journal of Mathematics, Involve – a Journal of Mathematics, Rose Hulman Undergraduate Mathematics Journal.

Jan 2014 – Jan 2020 **Member** of the editorial board for the Dolciani book series at the Mathematical Association of America.

June 17 – 28, 2019 **Co-organizer** of BAGEL, a two week summer school and conference on Geometry and Knot Theory held at the Institute for Mathematics and its Applications, Minneapolis, MN.

January 16–19, 2019 **Co-organizer** of *Not Knerds: a Community for Knot Theory*, an AMS Special Session titled held at the Joint Mathematics Meeting in Baltimore MD.

Mar. 2017 **Co-organizer** of a special session on *Knot Theory and its Applications* at the AMS sectional meeting, College of Charleston, Charleston SC.

Jan. 2017 **Co-organizer** of a Mathematical Association of America Invited Paper session on *Technical tools for 3D printing*, at the Joint Mathematics Meeting, Atlanta GA.