Emily J. Evans - Curriculum Vitae

CONTACT INFORMATION

Department of Mathematics
Brigham Young University
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EDUCATION

Ph.D., Mathematics, May, 2011
Worcester Polytechnic Institute, Worcester, MA

Certificate in College Teaching, 2011
Higher Education Consortium of Central Massachusetts, Worcester, MA

B.S., Economics, 1998
University of Utah, Salt Lake City, UT

APPOINTMENTS

Associate Chair, Brigham Young University	2023-present
Associate Professor, Brigham Young University	2020-present
Assistant Professor, Brigham Young University	2014-2020
Visiting Assistant Professor, Brigham Young University	2011-2014
Adjunct Instructor, Worcester Polytechnic Institute	2011
Senior Software Engineer, Hewlett-Packard	2001-2005

PUBLICATIONS

E.J. Evans. "A Finite Element Approach to Hölder Extension using Prefractals." *Methods and Applications of Analysis*, Vol. 19, No. 2, 2012.
http://dx.doi.org/10.4310/MAA.2012.v19.n2.a4

E.J. Evans. "A Finite Element Approach to H^1 Extension using Prefractals." *Advances in Mathematical Sciences and Applications*, Vol. 22, 2012.
https://pdfs.semanticscholar.org/4fbc/b556230b594ee9d2ac6a7fe1ecaf1f7325f5.pdf

E.J. Evans, H. Liang. "Singular homogenization for Sierpinski pre-fractals." *Nonlinear Analysis Real World Applications*. 14(5):1975-1991, 2013.
http://dx.doi.org/10.1016/j.nonrwa.2013.02.002.

J.C. Dallon, E.J. Evans, C. P. Grant, and W.V. Smith. "Cell speed is independent of force in a mathematical model of amoeboidal cell motion with random switching terms." *Mathematical Biosciences*, 246(1):1-7, Nov. 2013.
http://dx.doi.org/10.1016/j.mbs.2013.09.005.

M.A. Scott, D.C. Thomas, and E.J. Evans. "Isogeometric Spline Forests." *Computer Methods in Applied Mechanics and Engineering*. 269:222-264, Feb. 2014.
http://dx.doi.org/10.1016/j.cma.2013.10.024.

S. Holladay, E.J. Evans, P. Egbert. "Surface Detail Augmentation for Granular Material Simulations." *Computer Graphics International 2014*, June 2014.

J. C. Dallon, E. J. Evans, and H. P. Ehrlich. "A Mathematical Model of Collagen Lattice Contraction." *Journal of the Royal Society Interface* 11(99), Oct. 2014.
http://dx.doi.org/10.1098/rsif.2014.05981742-5662.

E.J. Evans, M.A. Scott, X. Li, and D.C. Thomas. "Hierarchical T-splines: Analysis-suitability, Bézier extraction, and application as an adaptive basis for isogeometric analysis." *Computer Methods in Applied Mechanics and Engineering* 284:1-20, Feb. 2015. http://dx.doi.org/10.1016/j.cma.2014.05.019.

D.C. Thomas, M.A. Scott, J.A. Evans, K. Tew, and E.J. Evans. "Bézier projection: A unified approach for local projection and quadrature-free refinement and coarsening of NURBS and T-splines with particular application to isogeometric design and analysis." *Computer Methods in Applied Mechanics and Engineering* 284:55-105, Feb. 2015. http://dx.doi.org/10.1016/j.cma.2014.07.014.

I.A. Henriksen, E.J. Evans, D. C. Thomas "A New Algorithm for the Evaluation of Generalized B-splines." October 2015. https://arxiv.org/abs/1510.04090

I.A. Henriksen, E.J. Evans. "A Refinement Algorithm for Generalized B-splines." December 2015. https://arxiv.org/abs/1512.09359

J.C. Dallon, L.C. Despain, E.J. Evans, C.P. Grant, and W.V. Smith. "A continuous time mathematical model of centrally controlled motion with random switching terms." *Journal of Mathematical Biology*, 2016. http://dx.doi.org/10.1007/s00285-016-1040-2.

E.J. Evans "Teaching Advanced Spectral Theory to Undergraduates Using Computer Labs." *IMAGE*, Spring 2017. https://www.ilasic.org/IMAGE/IMAGES/image58.pdf

W. Barrett, E. J. Evans, A.E. Francis. "Resistance Distance in Straight Linear 2-Trees." *Discrete Applied Mathematics*, Volume 258, 2019, Pages 13-34. https://doi.org/10.1016/j.dam.2018.10.043.

J.C. Dallon, E.J. Evans, C.P. Grant, and W.V. Smith. "Cell Velocity is Asymptotically Independent of Force: A Rigorous Model with Random Switching." *Journal of Differential Equations* 268:301-317 (2019). https://doi:10.1016/j.jde.2019.08.019 https://arxiv.org/abs/1507.04787

J. C. Dallon Lynnae C. Despain, Emily J. Evans and Christopher P. Grant. "A continuous-time stochastic model of cell motion in the presence of a chemoattractant." *Discrete Continuous Dynamical Systems. Series B* 25 (2020).https://doi:10.3934/dcdsb.2020129

W. Barrett, E. J. Evans, A.E. Francis, M. Kempton, J. Sinkovic. "Spanning 2-Forests and Resistance Distance in 2-Connected Graphs." *Discrete Applied Mathematics* 20:341-352 (2020). https://doi:10.1016/j.dam.2020.03.061

W. Barrett, E. J. Evans, A. E. Francis. "Resistance distance and spanning 2-forest matrices of linear 2-trees." *Linear Algebra and its Applications* 606:41-67 (2020). https://doi.org/10.1016/j.laa.2020.06.031

E. J. Evans, W. Guo, A. Genctav, S. Tari, C. Domeniconi, A. Murillo, J. Chuang, L. AlSumait, P. Mani, N. El-Zehiry. "Role Detection and Prediction in Dynamic Political Networks." *Advances in Data Science. Association for Women in Mathematics Series*,

vol 26. Springer, Cham (2021). https://doi.org/10.1007/978-3-030-79891-8_10.

N. Neubert, E. J. Evans, J.C. Dallon. "How Structural Features of a Spring-Based Model of Fibrous Collagen Tissue Govern the Overall Young's Modulus." *Journal of Biomechanical Engineering*. 44(2):024501 (2022). https:\doi:10.1115/1.4052113.

E. J. Evans, A. E. Francis. "Algorithmic techniques for finding resistance distances on structured graphs." *Discrete Applied Mathematics* 320:387-407(2022).

W. Barrett, E. J. Evans, H.T. Hall, M. Kempton. "New conjectures on algebraic connectivity and the Laplacian spread of graphs." *Linear Algebra and its Applications* 648:104-132 (2022)

E.J. Evans, R. Jones, J. Leung, B.Z. Webb, "Using social networks to improve team transition prediction in professional sports." *PLoS ONE* 17(6): e0268619 (2022).

J.C. Dallon, C. Leduc, C.P. Grant, E.J. Evans, S. Etienne-Manneville, S. Portet "Using Fluorescence Recovery After Photobleaching data to uncover filament dynamics". *PLoS Computational Biology* 18(9): e1010573 (2022).

E.J. Evans, R.J. Hendel "An infinite 2-dimensional array associated with circuits". *Fibonacci Quarterly* 60(5):151-171 (2022).

E.J. Evans, R.J. Hendel. "Resistance values under transformations in regular triangular grids." *Submitted*.

W. Barrett, T. Cameron, E. J. Evans, H.T. Hall, M. Kempton. "On the Laplacian Spread of Digraphs." *Submitted*.

E. J. Evans, A.E. Francis. "Monotonicity of resistance distance in linear 2–trees." *Submitted*.

J. Song, E.J. Evans, J.C. Dallon. "Cell Motion In Aggregate: A Mathematical Model of the Slug Stage of Dictyostelium discoideum" *Submitted*.

E. J. Evans, M. Graham. "An interdisciplinary survey of network similarity methods." *Submitted*.
https://arxiv.org/abs/1905.06457.

E.J. Evans. "A Finite Element Approach to C^β Extension using Prefractals." Technical Report MS-3-1-47, WPI Mathematical Sciences Department, March 2011.

E.J. Evans. "A Novel Finite Element Meshing Technique Driven by Fractal Koch Curves." Technical Report 8-19-41, WPI Mathematical Sciences Department, August 2008.

Textbooks

J. Humpherys, T. J. Jarvis, E.J. Evans. *Foundations of Applied Mathematics Volume I: Mathematical Analysis*. Society for Industrial and Applied Mathematics. Philadelphia, PA. July 2017. 726 pages.
Table of Contents

J. Humpherys, T.J. Jarvis, E.J. Evans. *Lab Manual for Foundations of Applied Mathematics V1*. July 2017.

https://foundations-of-applied-mathematics.github.io

J. Humpherys, T.J. Jarvis, E.J. Evans. *Lab Manual for Foundations of Applied Mathematics V2*. July 2020.
https://foundations-of-applied-mathematics.github.io

J. Humpherys, T.J. Jarvis, E.J. Evans. *Lab Manual for Foundations of Applied Mathematics V3*. Ongoing.
https://foundations-of-applied-mathematics.github.io

Invited Talks

Case Western University, Applied Math Seminar *Patterns, algorithms and your friends*	Cleveland, Ohio October 2022
Fibonacci Conference *An infinite 2-dimensional array associated with circuits*	Sarajevo, Bosnia and Herzegovina July 2022
ILAS 2022, *From Beginner to Expert: increasing linear algebra fluency and comfort with Python labs*	Galway, Ireland June 2022
University of Utah, Applied Math Seminar *Force-based models of cell-extracellular interaction*	Salt Lake City, Utah April 2022
Joint Mathematics Meetings *Resistance Distance in Triangular Grids*	Virtual April 2022
Brigham Young University, Math Focus Talk *That was unexpected*	Provo, Utah November 2021
ACDA 21 *Algorithms for the calculation of resistance distance*	Virtual July 2021
Utah Valley University Colloquium *Algorithmic techniques for finding resistance distances on structured graphs with an application to linear 2–trees*	Orem, Utah April 2021
2021 Intermountain MAA Section Meeting *Python Labs for Multivariate Calculus Understanding*	Virtual March 2021
Kansas State University *Force-based models of cell-extracellular interaction*	Wichita, Kansas October 2019
ICMAA *Spanning 2-Forests, Resistance Distance, and the Laplacian Matrix*	Reno, Nevada July 2019
The Coalition for National Science Funding *Transforming Undergraduate Education: Preparing Students for a Computational and Data Driven Future*	Washington DC May 9, 2018

Brigham Young University *The Secret Life of Math*	Provo, UT March 1, 2018
SIAM Annual Meeting *Isogeometric Analysis and Hierarchical T-splines*	Pittsburgh, PA July 13, 2017
ICCS 2017 *Foundations of Applied Mathematics*	Zurich, Switzerland June 12, 2017
Worcester Polytechnic Institute *Force-based models of cell-extracellular interaction*	Worcester, MA April 28, 2017
Carroll College *The Secret Life of Math*	Helena, MT March 21, 2017
MAA Session on Innovative and Effective Ways to Teach Linear Algebra *Undergraduate Spectral Theory with Computer Labs.*	Atlanta, GA January 5, 2017
CAIMS 2016 Annual Meeting *A Mathematical Model of Collagen Lattice Contraction*	Edmonton, Alberta, Canada June 2016
USNCCM13 *Evaluation And Refinement of Generalized B-Splines*	San Diego, CA July 2015
SIAM Conference on Geometric and Physical Modeling *Hierarchical T-Splines*	Denver, CO November 12, 2013
USNCCM12 *Hierarchical T-Splines*	Raleigh, NC July 24, 2013
AMS Western Sectional Meeting *Finite Element Techniques for Prefractal Problems*	Salt Lake City, UT October 23, 2011
Brigham Young University *Extension Operators and Finite Elements for Fractal Boundary Value Problems*	Provo, UT April 7, 2011
AWM Poster Session at the JMM *A Finite Element Approach to C^β Extension using Prefractals*	New Orleans, LA January 9, 2011
MIT Lincoln Labs *Extension Operators and Finite Elements for Fractal Boundary Value Problems*	Lexington, MA January 5, 2011
Universita di Roma "La Sapienza" *Finite Element Techniques for Prefractal Problems*	Rome, Italy October 19, 2010
AMS Northeastern Section Meeting *A Novel Finite Element Meshing Technique Driven by Fractal Koch Curves*	Worcester, MA April 25-26, 2009

Contributed Talks

Joint Mathematics Meetings *Resistance Distance in Triangular Grids*	Virtual April 2022
Joint Mathematics Meetings *Resistance Distance in Linear 2-Trees*	San Diego, CA January 2018
Joint Mathematics Meetings *A novel technique for calculating the effective resistance of an undirected graph*	Atlanta, GA January 7, 2017
SIAM CSE *Hierarchical HPK-Adaptivity for Isogeometric Analysis*	Salt Lake City, UT March 18, 2015
Joint Mathematics Meetings *Mathematics of Hierarchical T-Splines*	Baltimore, MD January 16, 2014

Academic Visits

Isaac Newton Institute, Cambridge, England (December 2015).

Mathematical Sciences Research Institute, Berkeley, California (June 2019).

The Institute for Computational and Experimental Research in Mathematics, Brown, Rhode Island (July 2019).

The Institute for Computational and Experimental Research in Mathematics, Brown, Rhode Island (August 2022).

Awards and Grants

Savage Foundation Teaching Award	November 2021
College of Physical and Mathematical Sciences Citizenship Award	July 2021
NSF Geology Grant A Machine-Learning Approach to Quantitative Phase Analysis of Whole Rocks and Sediments	August 2020-August 2023
BYU Faculty Women's Association Citizenship Award	July 2020
Mathematics Department Mentoring Award	December 2018
SIAM Science Policy Fellow As part of the fellowship I travel to Washington DC several times a year where I meet with senators, representatives, and key leaders in government agencies.	January 2018–December 2019
BYU MEG Grant Metrics and Predictions for Directed Networks	December 2017
Mathematics Department Citizenship Award	December 2016
BYU MEG Grant Mathematical modeling of cell-cell and cell-extracellular matrix interactions	December 2015
Mathematics Department Graduate Research Award	April 26, 2011

Teaching and other Experience

Brigham Young University 2011-present

Classes taught: Math 112 (Differential Calculus), Math 113 (Integral Calculus), Math 314 (Multivariable Calculus), Math 342 (Undergraduate Analysis 2), Math 320 (Algorithm Analysis), Math 322 (Numerical Optimization), Math 344 (Linear and Nonlinear Analysis I), Math 346 (Linear and Nonlinear Analysis II), Math 402 (Modeling with Uncertainty and Data I), Math 404 (Modeling with Uncertainty and Data II), Math 406R (Mathematics of Data Science), Math 510 (Graduate Numerical Linear Algebra), Math 511 (Graduate Numerical Differential Equations), Math 611 (Finite Elements)

Senior Software Engineer, Hewlett Packard 2001 - 2005

Technical Lead for Digital Pen and Paper product. Also developed applications for HP's hand held device.

Software Engineer, Lavastorm 2000 - 2001

Part of a team that developed an online trivia game. Also was assigned to develop a reusable code base for the company.

Software Engineer, EMC 1996-1997, 1999-2000

Developed several applications in C for manufacturing.

Outreach

Brigham Young University K-3 Math Circles (Math activities for children 5-8 years old)	Provo, UT 2013-present
Brigham Young University *Math in Industry* (Presentation for junior high and high school math teachers)	Provo, UT June 11, 2015
Utah Valley University *Expanding Your Horizons: Coloring maps* (Presentation for junior high and high school girls)	Orem, UT March 22, 2014
Brigham Young University *STEM OUT: Build your own fractals* (Presentation for junior high and high school students)	Provo, UT November 9, 2013
Brigham Young University *Something in Between: Fractals and Dimension* (Presentation for junior high and high school students)	Provo, UT June 25, 2013
Utah Valley University *Expanding Your Horizons: Build Your own fractals* (Presentation for junior high and high school girls)	Orem, UT March 2, 2013

PhD Students

Rebecca Jones (2018-2022): *Using Connections to Make Predictions on Dynamic Networks.*

Students Mentored

Olivia Hopkin (undergraduate, October 2022-present): *RockJockML.*

Alicia Rainey (undergraduate, January 2022-present): *A 3D model of Collagen Contraction.*

Brigg Trendler (undergraduate, January 2022-present): *Collagen Modeling.*

Jake Murphy (undergraduate, September 2021-September 2022): *MathFire.*

Daniel Smith (undergraduate, September 2021-September 2022): *MathFire.*

Damian Andersen (undergraduate, September 2021-present): *MathFire.*

Chloe Hart (undergraduate, May 2021-August 2022): *Fibroblast Motion on Fractal Surfaces.*

Jake Snow (undergraduate, October 2020-February 2022): *MathFire.*

Martha Morrise (graduate, October 2020-present): *STAT Solvers.*

Walker Hughes(undergraduate, October 2020-April 2021): *MathFire.*

Spencer Chandler (undergraduate, October 2021-present): *RockJockML.*

Hunter Lybbert (undergraduate, October 2020-August 2021): *MathFire.*

Matthew Daw (undergraduate, October 2020-April 2021): *MathFire.*

Amber Oldroyd (undergraduate, October 2020-April 2021): *MathFire.*

Mikelle Rogers (undergraduate, October 2018-July 2021): *Effective Resistance on Graphs.*

Sam Dailey (undergraduate, September 2018-April 2022): *A 3D model of Collagen Contraction.*

Julia Bohman (undergraduate, February 2018-April 2019): *Similarity Measures and Machine Learning for Networks.*

Benjamin Burt (undergraduate, October 2017-March 2018): *Similarity Measures for Networks.*

Jason Kinghorn (undergraduate, September 2017-April 2019): *Social Networks for Improved Group Transition.*

Juan Rodriquez (undergraduate, May 2016-May 2018): *Centrality Measures for Large Networks.*

Marissa Graham (undergraduate and graduate, February 2015-December 2018): *Multigrid Methods for Isogeometric Analysis.*

Allyson Tom (undergraduate, October 2016-May 2017): *Link Prediction on Directed Networks.*

Amelia Henriksen (undergraduate, April 2015–July 2016): *Improved Modeling for Prosthetic Implants.*

Nathaniel Merrill (undergraduate, April 2015–August 2016): *A Model of Collagen Contraction* and *The Drazin Inverse for Effective Resistance.*

Emma Dallon (undergraduate, February 2014–September 2016): *Modeling Movement of a Cell on a Single Fiber.*

Ian Henriksen (graduate, October 2013–August 2015): *Evaluation and Refinement of Generalized B-Splines.*

Hannah Noble (undergraduate, October 2013–April 2014): *Finite Elements for Fractal Mixtures.*

Joshua Fetbrandt (graduate, October 2012–June 2014): *Hölder Extensions for Non-standard Fractal Koch Curves.*